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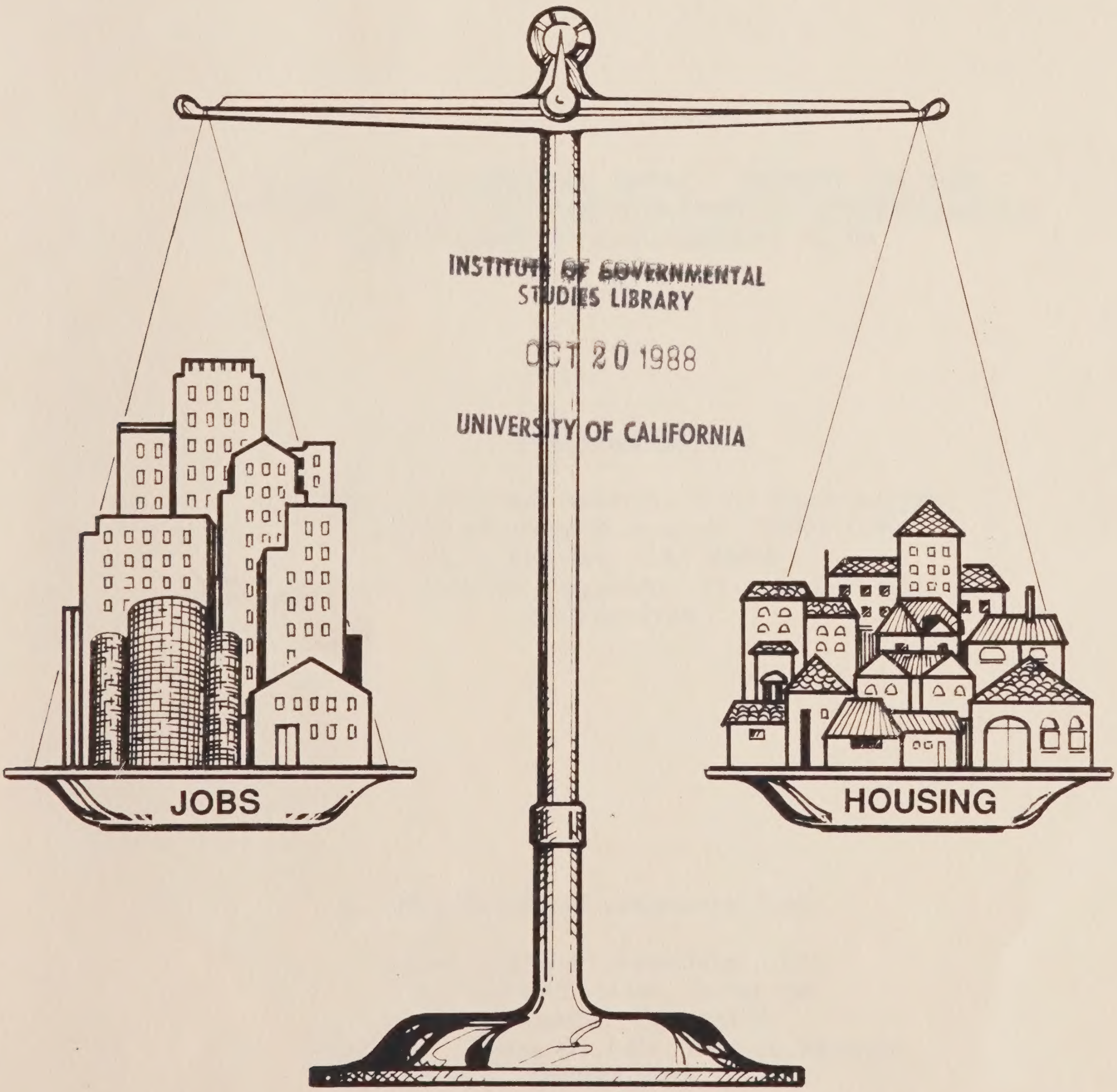
GROWTH MANAGEMENT PLAN

OCTOBER 1988

DRAFT ENVIRONMENTAL IMPACT REPORT



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SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

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DRAFT ENVIRONMENTAL IMPACT REPORT ON THE SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENT'S DRAFT GROWTH MANAGEMENT PLAN

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CHAPTER 1. INTRODUCTION

PURPOSE OF ENVIRONMENTAL IMPACT REPORT

This Environmental Impact Report (EIR) has been prepared to assess the impacts of the Southern California Association of Government's (SCAG) Draft Growth Management Plan (GMP). The EIR is prepared pursuant to the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000 et seq.) and the State CEQA Guidelines (14 California Administrative Code Section 15000 et seq.).

The purposes of the EIR are to:

- o provide a mechanism for disclosing potential environmental impacts of the Draft GMP relative to existing conditions;
- o increase citizens' awareness of and foster participation in the planning process for the Draft GMP; and
- o alert SCAG's Executive Committee to the effects of the plan and suggest measures to be taken to mitigate impacts.

EIR REQUIREMENT

The Draft GMP is considered a "project" as defined by CEQA and State CEQA Guidelines (Section 15378). SCAG has determined that the project could have significant environmental impacts. The EIR is an informational document to aid in the regional planning and decision-making process. It assesses the potential individual and cumulative effects that the project may have on the environment, lists ways to minimize significant impacts, and evaluates alternatives to the proposed project.

The most recent adopted regional growth forecast, SCAG-82 Modified, was similarly evaluated in Draft and Final Supplemental EIRs (Southern California Association of Governments 1984, 1985a).

SCOPE OF EIR

As provided for in State CEQA Guidelines, the focus of the Draft EIR is limited to specific issues and concerns identified as possibly significant by SCAG and the Notice of Preparation process. This EIR assesses the likely environmental consequences in 2010.

The State CEQA Guidelines require that EIR impact analyses correspond to the degree of specificity involved in the underlying activity being analyzed in the EIR. Due to the programmatic nature and regional scale of the GMP forecast, impacts related to the Draft GMP are primarily assessed at a regional level. Some impacts are also evaluated at the county level. Local impacts can be more appropriately addressed at the time that the respective general plans and other local projects undergo environmental review; such impacts can be predicted with greater accuracy at the local plan and project level.

ORGANIZATION OF THE EIR

Chapter 2 describes the preferred growth management alternative, as well as 6 other alternatives: the baseline projection, jobs/housing balance alternative, local plans alternative, emerging futures alternative, an alternative with a lower regional total, and an alternative with a higher regional total. Chapter 3 presents a summary of the impacts and mitigation measures associated with the preferred growth management alternative and the 6 alternatives. Each of the following chapters (Chapters 4-11) is devoted to a single impact topic. Within each section, relevant environmental setting data are presented, significant impacts and effects associated with the proposed project and the six alternatives are evaluated, and mitigation measures are identified to reduce impacts of the preferred alternative and baseline projection (No Project Alternative) to less than significant. Chapter 12 contains a bibliography.

CHAPTER 2. PROJECT DESCRIPTION

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS GROWTH MANAGEMENT PROCESS

This Draft EIR evaluates the Draft GMP (Southern California Association of Governments 1988h). The Draft GMP contains existing (1984) and projected (2010) quantitative information on population, housing, and employment growth in the six-county SCAG region (Figure 2-1) for seven growth management alternatives (GMAs), one of which is the preferred alternative (proposed project). The SCAG Executive Committee is scheduled to adopt the GMP and certify the GMP EIR in December 1988. The adopted GMP will represent the seventh in a series of regional growth forecasts prepared by SCAG, superseding the previous forecast, SCAG-82 Modified. The GMP will be the basis for regional transportation, air quality, water quality, housing, and other regional planning efforts in southern California until it is updated. For this reason, this EIR evaluates effects of the GMP in relation to the Regional Mobility Plan (RMP), Regional Housing Needs Assessment (RHNA), and the Air Quality Management Plan (AQMP). The RMP and AQMP are scheduled for adoption in December 1988; their respective EIRs are also scheduled for certification at this time.

The population of the SCAG region grew from approximately 5 million in 1950 to nearly 14 million by 1987 and is projected to increase to 17.1 million, 18.3 million, or 20.2 million by 2010, depending on the alternative(s) considered. The extensive development and urbanization of this region have been associated with a growing need to assess traffic congestion, air quality, water supply and quality, housing, public services, and other environmental issues.

GROWTH MANAGEMENT PLAN OBJECTIVES, PLANNING PRINCIPLES, AND IMPLEMENTATION PROCESS

Objectives and Strategies

The principal objectives of the GMP are to coordinate regional and local decisions with respect to future growth and development and to minimize future environmental impacts. The GMP is based on the following objectives of the RSP as identified by SCAG (Southern California Association of Governments 1988h, 1988i):

- provide a common framework for the development and integration of the major SCAG plans;

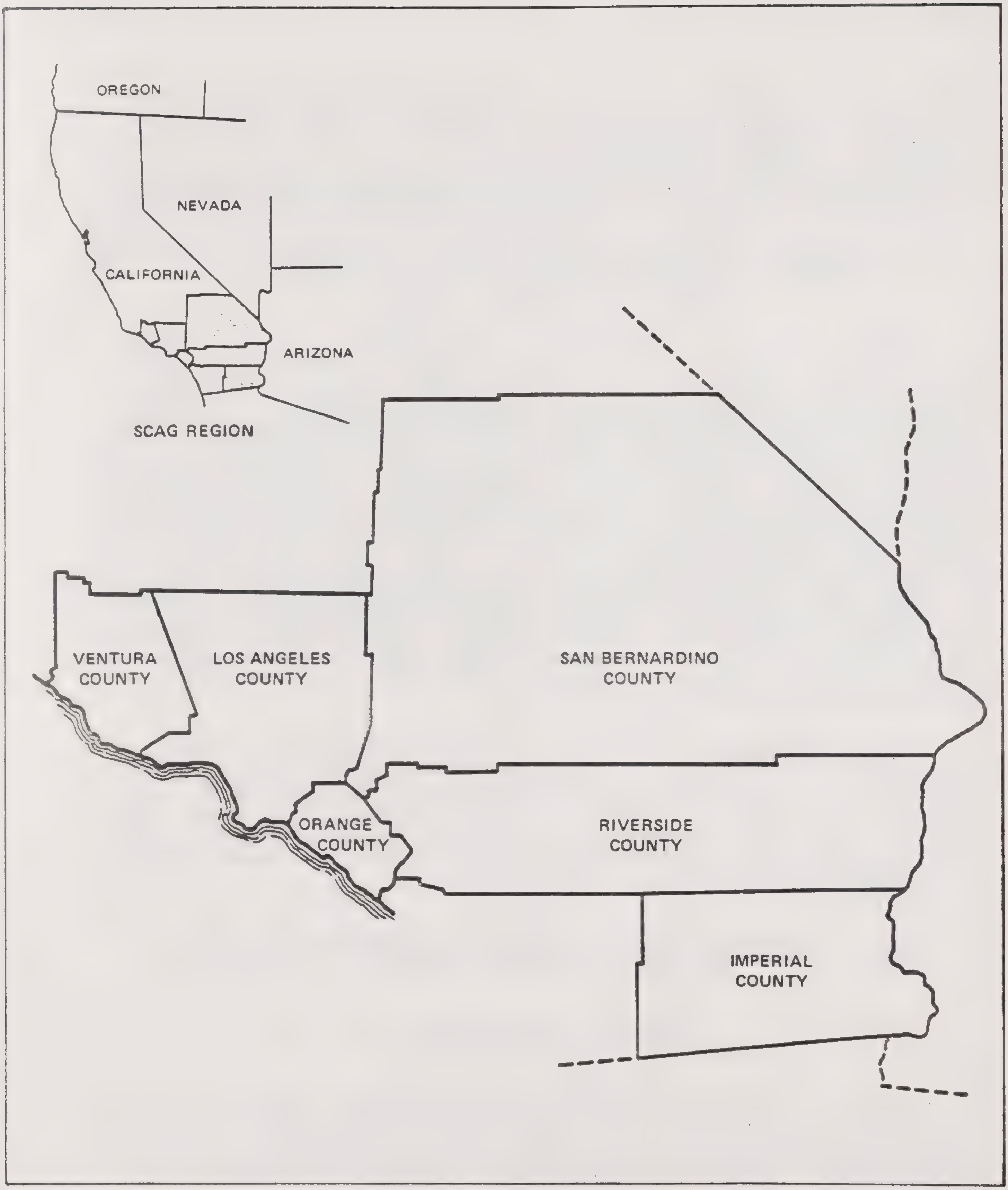


FIGURE 2-1. SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS REGIONAL PLANNING AREA

- o depict a vision of the region's demographic, economic, sociocultural, and governmental future;
- o set goals for the preservation of the environment, quality of life, and individual options; and
- o define major contingencies which could disrupt that vision and to develop appropriate prevention and response measures.

Policies

The policies of the Draft GMP are listed below:

- o Form the basis for the SCAG functional plans, and be consistent with the RMP, AQMP, and the RHNA.
- o Achieve better J/H balance at the subregional level; encourage and provide incentives in job-rich subregions to attract housing growth; and encourage and provide incentives in housing-rich subregions to attract job growth;
- o To the degree possible, achieve a balance, by subregion, of the type of jobs with the price of housing, and promote balanced development of type of jobs and type of housing;
- o Encourage employment development in job-poor localities through support of labor force retraining programs;
- o To the extent possible, reflect current local jurisdictional policies related to population, housing, and employment in the development of J/H balance targets;
- o Encourage growth to occur in and around:

  - activity centers
  - transportation nodes and corridors
  - underutilized infrastructure systems
  - areas needing recycling and redevelopment;
- o Forecast permanent populations for areas with large seasonal population fluctuations (i.e., resort areas) (however, appropriate infrastructure systems should be sized to serve the high-season population total);
- o Preserve open space areas identified in local, state, and federal plans and those in SCAG's Conservation and Open Space Plan; preserve, wherever possible, prime agricultural land and open space areas separating communities; protect vital natural resources as wetlands, groundwater recharge areas, woodlands, production lands, and land containing unique or endangered plants and animals; and

- o Limit development or use special design requirements for land with low suitability for development (i.e., areas with steep slopes, high fire flood, and seismic hazards).

Implementation Process

The GMP implementation strategy, described in Chapter VIII of the Draft GMP, identifies agencies responsible for carrying out the proposed action(s) and a proposed time schedule. It is based on the voluntary participation of local jurisdictions. It also involves existing regional and state agencies, various private sector interest groups, as well as the formation of subregional entities similar in concept to the existing transportation study areas.

The initial phase of the implementation process entails planning and implementing J/H balance measures, monitoring, and progress assessment. Additional actions can be considered if it is estimated, towards the end of the first 5-year period, that J/H balance targets will not be met.

The recommended implementation program is based on the following premises:

- o implementation is carried through by existing authorities;
- o implementation is guided by presently available regulatory measures;
- o implementation presupposes the voluntary participation of local jurisdictions in the planning and implementation of the process;
- o implementation through incremental legislative and regulatory actions can be considered if local actions fail; and
- o implementation is consistent with the timeline proposed in the AQMP.

Implementation of the GMP entails an outreach effort, the development of J/H balance targets and measures to attain them, as well as a monitoring and reassessment system.

Outreach

This effort entails implementing an outreach and information system, whereby the benefits of achieving J/H balance are widely disseminated. SCAG's responsibility, with the assistance of subregional entities, would be to design and carry through an outreach program intended to promote the advantages of attaining J/H balance targets. SCAG can reach the general public and local jurisdiction officials by broadly advertising the possible gains, at the regional and local level, of J/H balance implementation.

Development of Job/Housing Balance Targets

With the assistance of local jurisdictions and subregional entities, SCAG would develop, for each subregion and for local jurisdictions, J/H balance targets in 5-year increments based on the distribution of jobs and housing units by subregion under the preferred growth management alternative. Cities within a subregion, with the participation of subregional entities if they so elect, can trade targets as long as the subregional allocations are maintained.

Development of Local Measures

Local jurisdictions would select the measures necessary for the achievement of J/H balance targets. Several options can be considered to tailor the course of action to the jurisdiction's situation.

SCAG's task would be to develop a menu of actions that can be undertaken at the local level to support the job/housing balance objectives. Appendix 1 of the GMP suggests a list of optional measures which can be pursued by local authorities.

Monitoring

With the assistance and review of local jurisdictions and subregional entities, SCAG would develop a consistent and replicable evaluation system to assess, on a yearly basis, progress in meeting subregional J/H balance goals. The monitoring process should be structured so as to exclude projects that are exempt from the review and implementation process.

Implementation

Local jurisdictions should develop general plans that incorporate regional and local J/H balance objectives as well as elements of the AQMP and RMP. Local jurisdiction adoption of measures and ordinances that foster J/H balance is targeted for January 1, 1990.

SCAG's task would be to promote implementation of the J/H balance policy through such programs as A-95 and the Transportation Improvement Program.

Assessment of Consistency with Targets

The following are proposed evaluation criteria:

- Projects which should be exempt from the review and mitigation process are proposals for low-income housing and for senior citizen housing, and proposals to add needed jobs in economically depressed areas.

o Projects which would add jobs or housing in a local jurisdiction within the J/H balance targets would be handled by the normal permitting process.

o Projects which the local jurisdictions wishes to approve but which exceed local targets and contribute to J/H imbalance at the subregional level could require conditional permits until mitigation measures that bring the subregional J/H balance within the targeted ratio are met.

o Housing projects in job-rich subregions and job development projects in housing-rich subregions should not be subject to review and conditional permitting as long as they contribute to further balancing at the subregional level. Such projects should be encouraged and granted additional incentives.

Reassessment

If by January 1, 1994, it is estimated, through the monitoring process, that the J/H balance targets at the subregional level will not be met, the targets and measures to attain them, could be reassessed. By that time, data from the 1990 Census will be available and will provide a benchmark for the reevaluation of subregional J/H balance targets. For areas where it is assessed that J/H imbalance has worsened, additional implementation measures could be considered. SCAG, in cooperation with local jurisdictions, subregional entities, and SCAQMD could revise the implementation measures to be applied.

DESCRIPTION OF GROWTH MANAGEMENT ALTERNATIVES

The Draft GMP defines seven GMAs by population (Table 2-1), housing (Table 2-2), and employment (Table 2-3) at the regional, subregional (urbanized, urbanizing, and mountain/desert), and county level:

o proposed project (GMA-4 modified jobs/housing or preferred alternative),
o GMA-1 or baseline projection (No Project Alternative),
o GMA-2 or jobs/housing balance alternative,
o GMA-3 or local plans alternative,
o GMA-4 or emerging futures alternative
o GMA-Low, and
o GMA-High

Regional population is forecast at 17.1-20.2 million persons, regional housing at 7.2-8.1 million units, and regional employment at 8.7-9.3 million jobs in 2010 under these alternatives. Regional totals for the proposed project, GMA-1, GMA-2, GMA-3, and GMA-4 are equivalent; however, growth within the region has been distributed differently among three subregions and among counties under these alternatives based on the planning assumptions described in the following sections. GMA-Low has 19 percent less population projected than these alternatives, 6 percent less housing,

Table 2-1. Population Projections by County and Subregion Under Existing Conditions (1984), Proposed Project, and Alternatives

	VENTURA COUNTY	LOS ANGELES COUNTY	ORANGE COUNTY	RIVERSIDE COUNTY	SAN BERNARDINO COUNTY	IMPERIAL COUNTY	URBANIZED SUBREGION	URBANIZING SUBREGION	MOUNTAIN/ DESERT SUBREGION	REGIONAL TOTAL
1984	579,954	7,862,663	2,066,400	757,472	1,014,469	101,732	9,019,165	2,722,480	641,045	12,382,690
Growth, 1984-2010										
Proposed Project (GMA-4 Modified)	335,246	2,368,537	915,800	1,050,628	1,164,831	38,468	2,053,835	2,820,920	998,755	5,873,510
Alternatives										
GMA-1 (No Project)	329,646	2,086,237	983,800	1,211,828	1,203,731	58,268	1,894,735	3,087,020	891,755	5,873,510
GMA-2	329,646	2,290,737	1,084,600	1,028,928	1,082,331	58,268	2,168,335	2,926,320	778,855	5,874,510
GMA-3	329,646	2,162,037	764,700	1,284,028	1,272,031	61,068	1,903,735	3,037,320	932,455	5,873,510
GMA-4	356,046	2,303,937	909,700	1,102,528	1,126,731	74,568	2,048,635	2,899,820	925,055	5,873,510
GMA-Low	283,846	1,826,937	867,100	823,228	888,231	63,368	1,570,135	2,322,020	860,555	4,752,710
GMA High	456,546	3,123,437	1,181,900	1,426,628	1,581,831	45,068	2,706,135	3,780,920	1,328,355	7,815,410
2010										
Proposed Project (GMA-4 Modified)	915,200	10,231,200	2,982,200	1,808,100	2,179,300	140,200	11,073,000	5,543,400	1,639,800	18,256,200
Alternatives										
GMA-1 (No Project)	909,600	9,948,900	3,050,200	1,969,300	2,218,200	160,000	10,913,900	5,809,500	1,532,800	18,256,200
GMA-2	909,600	10,153,400	3,151,000	1,786,400	2,096,800	160,000	11,187,500	5,648,800	1,419,900	18,257,200
GMA-3	909,600	10,024,700	2,831,100	2,041,500	2,286,500	162,800	10,922,900	5,759,800	1,573,500	18,256,200
GMA-4	936,000	10,166,600	2,976,100	1,860,000	2,141,200	176,300	11,067,800	5,622,300	1,566,100	18,256,200
GMA-Low	863,800	9,689,600	2,933,500	1,580,700	1,902,700	165,100	10,589,300	5,044,500	1,501,600	17,135,400
GMA-High	1,036,500	10,986,100	3,248,300	2,184,100	2,596,300	146,800	11,725,300	6,503,400	1,969,400	20,198,100

Source: Southern California Association of Governments 1988h, 1988j

Note: Figures may vary minimally from those presented in the Preliminary Draft GMP (Southern California Association of Governments 1988h) due to adjustments made for consistency between 2010 regional totals.

Table 2-2. Housing Projections, by County and Subregion, Under Existing Conditions (1984), Proposed Project, and Alternatives (Total Number of Units)

	VENTURA COUNTY	LOS ANGELES COUNTY	ORANGE COUNTY	RIVERSIDE COUNTY	SAN BERNARDINO COUNTY	IMPERIAL COUNTY	URBANIZED SUBREGION	URBANIZING SUBREGION	MOUNTAIN/ DESERT SUBREGION	REGIONAL TOTAL
1984	196,629	2,923,560	760,084	326,040	408,586	33,396	3,331,866	1,000,391	316,038	4,648,295
Growth, 1984-2010										
Proposed Project (GMA-4 Modified)	135,571	1,035,740	431,816	483,260	564,314	18,504	925,234	1,213,109	530,862	2,669,205
Alternatives										
GMA-1 (No Project)	139,771	911,840	463,716	566,260	561,614	26,004	855,034	1,333,509	480,662	2,669,205
GMA-2	139,771	1,000,540	506,716	486,560	509,614	26,004	972,634	1,273,409	423,162	2,669,205
GMA-3	139,771	963,840	340,616	602,660	595,014	27,304	868,334	1,295,309	505,562	2,669,205
GMA-4	144,171	1,006,740	435,116	525,460	525,714	32,004	925,934	1,252,509	490,762	2,669,205
GMA-Low	129,571	960,240	419,616	451,360	525,814	20,104	866,334	1,139,009	501,362	2,506,705
GMA-High	178,171	1,320,440	543,716	635,060	741,114	21,704	1,168,134	1,577,609	694,462	3,440,205
2010										
Proposed Project (GMA-4 Modified)	332,200	3,959,300	1,191,900	809,300	972,900	51,900	4,257,100	2,213,500	846,900	7,317,500
Alternatives										
GMA-1 (No Project)	336,400	3,835,400	1,223,800	892,300	970,200	59,400	4,186,900	2,333,900	796,700	7,317,500
GMA-2	336,400	3,924,100	1,266,800	812,600	918,200	59,400	4,304,500	2,273,800	739,200	7,317,500
GMA-3	336,400	3,887,400	1,100,700	928,700	1,003,600	60,700	4,200,200	2,295,700	821,600	7,317,500
GMA-4	340,800	3,930,300	1,195,200	851,500	934,300	65,400	4,257,800	2,252,900	806,800	7,317,500
GMA-Low	326,200	3,883,800	1,179,700	777,400	934,400	53,500	4,198,200	2,139,400	817,400	7,155,000
GMA-High	374,800	4,244,000	1,303,800	961,100	1,149,700	55,100	4,500,000	2,578,000	1,010,500	8,088,500

Source: Southern California Association of Governments 1988h, 1988j

Note: Figures may vary minimally from those presented in the Preliminary Draft GMP (Southern California Association of Governments 1988h) due to adjustments made for consistency between 2010 regional totals.

Table 2-3. Employment Projections, by County and Subregion, Under Existing Conditions (1984), Proposed Project, and Alternatives (Total Number of Jobs)

	VENTURA COUNTY	LOS ANGELES COUNTY	ORANGE COUNTY	RIVERSIDE COUNTY	SAN BERNARDINO COUNTY	IMPERIAL COUNTY	URBANIZED SUBREGION	URBANIZING SUBREGION	MOUNTAIN/ DESERT SUBREGION	REGIONAL TOTAL
1984	213,000	4,053,000	1,048,000	247,000	325,000	37,000	4,663,194	1,059,422	200,384	5,923,000
Growth, 1984-2010										
Proposed Project (GMA-4 Modified)	152,600	1,362,200	643,800	379,500	464,400	28,600	1,380,106	1,282,078	368,916	3,031,100
Alternatives										
GMA-1 (No Project)	127,000	1,471,100	872,000	219,000	315,000	27,000	1,715,306	1,098,078	217,716	3,031,100
GMA-2	154,600	1,290,000	750,800	362,100	446,600	27,000	1,433,806	1,353,878	243,416	3,031,100
GMA-3	158,800	1,498,500	521,500	324,500	500,800	27,000	1,496,806	1,243,878	290,416	3,031,100
GMA-4	165,300	1,420,500	653,600	319,300	432,400	40,000	1,440,006	1,137,778	453,316	3,031,100
GMA-Low	143,200	1,264,900	596,800	352,400	430,600	28,600	1,281,906	1,190,178	344,416	2,816,500
GMA-High	182,700	1,492,500	679,000	443,700	540,000	30,200	1,481,306	1,459,378	427,416	3,368,100
2010										
Proposed Project (GMA-4 Modified)	365,600	5,415,200	1,691,800	626,500	789,400	65,600	6,043,300	2,341,500	569,300	8,954,100
Alternatives										
GMA-1 (No Project)	340,000	5,524,100	1,920,000	466,000	640,000	64,000	6,378,500	2,157,500	418,100	8,954,100
GMA-2	367,600	5,343,000	1,798,800	609,100	771,600	64,000	6,097,000	2,413,300	443,800	8,954,100
GMA-3	371,800	5,551,500	1,569,500	571,500	825,800	64,000	6,160,000	2,303,300	490,800	8,954,100
GMA-4	378,300	5,473,500	1,701,600	566,300	757,400	77,000	6,103,200	2,197,200	653,700	8,954,100
GMA-Low	356,200	5,317,900	1,644,800	599,400	755,600	65,600	5,945,100	2,249,600	544,800	8,739,500
GMA-High	395,700	5,545,500	1,727,000	690,700	865,000	67,200	6,144,500	2,518,800	627,800	9,291,100

Source: Southern California Association of Governments 1988h, 1988j

Note: Figures may vary minimally from those presented in the Preliminary Draft GMP (Southern California Association of Governments 1988h) due to adjustments made for consistency between 2010 regional totals.

and 7 percent less employment. GMA-High has 33 percent more population, 29 percent more housing, and 11 percent more employment.

Figure 2-2 illustrates the three subregions. Urbanized subregions (referred to as "urban" subregion in the Draft GMP) are those in which more than half of the land area was urbanized in 1980. These include San Fernando Valley, central Los Angeles, Santa Monica Bay, Glendale/Pasadena, Long Beach/Downey, east San Gabriel Valley, and northwest Orange County. Urbanizing subregions are those in which less than half of the land area was urbanized in 1980. These include Oxnard/Ventura, Simi/Thousand Oaks, Santa Monica Mountains, Santa Clarita Valley, southeast Orange County, Chino Basin, Riverside/Corona, east San Bernardino Valley, and central Riverside County. Mountain/desert subregions are those that were predominantly rural in 1980. These include Los Padres, north Los Angeles County, Angeles/San Bernardino National Forests, San Bernardino County deserts, Riverside County deserts, Idyllwild, and Imperial County.

A brief description of each alternative follows. The preferred alternative and six additional alternatives are compared with regard to subregional and county population, housing, and employment on the table which begins on the following page.

Proposed Project (GMA-4 Modified or Preferred Alternative)

The proposed project was developed in three steps: 1) development of a "trend" projection incorporating 1988 data, 2) subregional housing and employment growth was adjusted to balance housing and jobs, and 3) the household and population forecast was developed.

To develop the trend projection, housing and employment growth patterns were analyzed from 1970 to 1988, giving more weight to the most recent years (1984-1988). This projection incorporates January 1, 1988 data from the California Department of Finance (DOF).

A model was developed whereby each subregion's J/H ratio under the trend projection (computed using added jobs and housing units) was adjusted by 20 percent toward the regional 2010 ratio by reallocating approximately 9 percent of the 1984-2010 employment growth from job-rich to housing-rich subregions and reallocating approximately 4.5 percent of 1984-2010 housing growth from housing-rich to job-rich subregions. Using a 20-percent adjustment factor for this 20-year planning period means that the J/H balance would theoretically be achieved in 100 years. Twelve percent (jobs) and 6 percent (housing) targets are reflected in GMA-2 and GMA-4. The proposed project (because of its shifts in future J/H ratios) results in a 9 percent movement of new jobs and a 4.5 percent movement of new housing units.

The population forecast was developed by applying subregional occupancy rates and average household size to the housing forecast.

Alternative	Subregional Projections and Trends (Population)
Proposed Project (GMA-4 Modified)	Urbanizing areas would experience the greatest absolute increase, growing by 2.82 million (104 percent). This increase represents 48 percent of the total population growth projected regionwide by 2010. The largest proportional increase would occur in mountain/ desert areas, where population would increase by 999,000 (156 percent). These trends would result in a general spreading of population from urbanized to urbanizing and mountain/desert areas. The proportion of the region's population living in urbanized areas would decline from 73 to 60 percent, while the comparable proportions for urbanizing and mountain/desert areas would increase from 22 to 32 percent and from 5 to 8 percent, respectively.
GMA-1 (No Project Alternative)	Urbanizing areas would experience the greatest absolute increase, growing by 3.09 million (113 percent). This increase represents 53 percent of the total population growth projected regionwide by 2010. The largest proportional increase would occur in mountain/desert areas, where population would increase by 892,000 (139 percent). These trends would result in a general spreading of population from urbanized to urbanizing and mountain/desert areas. The proportion of the region's population living in urbanized areas would decline from 73 to 60 percent, while the comparable proportions for urbanizing and mountain/desert areas would increase from 22 to 32 percent and from 5 to 8 percent, respectively.
GMA-2	Urbanizing areas would experience the greatest absolute increase, growing by 2.93 million (107 percent). This increase represents 50 percent of the total population growth projected regionwide by 2010. The largest proportional increase would occur in mountain/desert areas, where population would increase by 779,000 (122 percent). These trends would result in a general spreading of population from urbanized to urbanizing and mountain/desert areas. The proportion of the region's population living in urbanized areas would decline from 73 to 61 percent, while the comparable proportions for urbanizing and mountain/desert areas would increase from 22 to 31 percent and from 5 to 8 percent, respectively.
GMA-3	Urbanizing areas would experience the greatest absolute increase, growing by 3.04 million (112 percent). This increase represents 52 percent of the total population growth projected regionwide by 2010. The largest proportional increase (145 percent) would occur in mountain/desert areas, where population would increase by 933,000. These trends would result in a general spreading of population from urbanized to urbanizing and mountain/desert areas. The proportion of the region's population living in urbanized areas would decline from 73 to 60 percent, while the comparable proportions for urbanizing and mountain/desert areas would increase from 22 to 31 percent and from 5 to 9 percent, respectively.
GMA-4	Urbanizing areas would experience the greatest absolute increase, growing by 2.90 million (107 percent). This increase represents 49 percent of the total population growth projected regionwide by 2010. The largest proportional increase (144 percent) would occur in mountain/desert areas, where population would increase by 925,000. These trends would result in a general spreading of population from urbanized to urbanizing and mountain/desert areas. The proportion of the region's population living in urbanized areas would decline from 73 to 61 percent, while the comparable proportions for urbanizing and mountain/desert areas would increase from 22 to 31 percent and from 5 to 8 percent, respectively.
GMA-Low	Urbanizing areas would experience the greatest absolute increase, growing by 2.3 million (85 percent). This increase represents approximately 49 percent of the total population growth projected regionwide by 2010. The largest proportional increase (134 percent) would occur in mountain/desert areas, where population would increase by 861,000. These trends would result in a general spreading of population from urbanized to urbanizing and mountain/desert areas. The proportion of the region's population living in urbanized areas would decline from 73 to 62 percent, while the comparable proportions for urbanizing and mountain/desert areas would increase from 22 to 29 percent and from 5 to 9 percent, respectively.
GMA-High	Urbanizing areas would experience the greatest absolute increase, growing by 3.8 million (139 percent). This increase represents approximately 48 percent of the total population growth projected regionwide by 2010. The largest proportional increase (207 percent) would occur in mountain/desert areas, where population would increase by 1.33 million. These trends would result in a general spreading of population from urbanized to urbanizing and mountain/desert areas. The proportion of the region's population living in urbanized areas would decline from 73 to 58 percent, while the comparable proportions for urbanizing and mountain/desert areas would increase from 22 to 32 percent and from 5 to 10 percent, respectively.

Alternative	County Projections and Trends (Population)
Proposed Project (GMA-4 Modified)	Los Angeles County would experience the greatest absolute increase, growing by 2.37 million (30 percent). This increase represents 40 percent of the total population growth projected regionwide by 2010. Riverside County (21 percent), San Bernardino County (20 percent), and Orange County (16 percent) would also claim substantial shares of projected regional growth. The largest proportional increases would occur in Riverside County (139 percent) and San Bernardino County (115 percent). This trend would result in an eastward shift of the region's population distribution, as the proportion of persons living in Los Angeles County declines from 64 to 56 percent and the proportion living in Riverside and San Bernardino Counties increases from 14 to 22 percent.
GMA-1 (No Project Alternative)	Los Angeles County would experience the greatest absolute increase, growing by 2.09 million (27 percent). This increase represents 36 percent of the total population growth projected regionwide by 2010. Riverside County (21 percent), San Bernardino County (21 percent), and Orange County (17 percent) would also claim substantial shares of projected regional growth. The largest proportional increases would occur in Riverside County (160 percent) and San Bernardino County (119 percent). This trend would result in an eastward shift of the region's population distribution, as the proportion of persons living in Los Angeles County declines from 64 to 55 percent and the proportion living in Riverside and San Bernardino Counties increases from 14 to 23 percent.
GMA-2	Los Angeles County would experience the greatest absolute increase, growing by 2.29 million (29 percent). This increase represents 39 percent of the total population growth projected regionwide by 2010. Riverside, San Bernardino, and Orange Counties would each claim approximately 18 percent of projected regional growth. The largest proportional increases would occur in Riverside County (136 percent) and San Bernardino County (107 percent). This trend would generally result in an eastward shift in the region's population distribution, as the proportion of all persons living in Los Angeles County declines from 64 to 57 percent and the proportion living in Riverside and San Bernardino Counties increases from 14 to 21 percent.
GMA-3	Los Angeles County would experience the greatest absolute increase, growing by 2.16 million (27 percent). This increase represents 37 percent of the total population growth projected regionwide by 2010. Riverside County and San Bernardino County would each claim 22 percent of projected regional growth, with Orange County claiming 13 percent. The largest proportional increases would occur in Riverside County (170 percent) and San Bernardino County (125 percent). This trend would generally result in an eastward shift in the region's population distribution, as the proportion of all persons living in Los Angeles and Orange Counties would decline from 81 to 70 percent and the proportion living in Riverside and San Bernardino Counties would increase from 14 to 24 percent.
GMA-4	Los Angeles County would experience the greatest absolute increase, growing by 2.30 million (29 percent). This increase represents 39 percent of the total population growth projected regionwide by 2010. Riverside County and San Bernardino County would each claim 19 percent of projected regional growth, with Orange County claiming 15 percent. The largest proportional increases would occur in Riverside County (146 percent) and San Bernardino County (111 percent). This trend would generally result in an eastward shift in the region's population distribution, as the proportion of all persons living in Los Angeles County would decline from 64 to 57 percent and the proportion living in Riverside and San Bernardino Counties would increase from 14 to 21 percent.
GMA-Low	Los Angeles County would experience the greatest absolute increase, growing by 1.83 million (23 percent). This increase represents 38 percent of the total population growth projected regionwide by 2010. San Bernardino, Orange, and Riverside Counties would claim 19, 18, and 17 percent of projected regional growth, respectively. The largest proportional increases would occur in Riverside and San Bernardino Counties (109 and 88 percent, respectively). This trend would generally result in an eastward shift in the region's population distribution, as the proportion of all persons living in Los Angeles County would decline from 64 to 57 percent and the proportion living in Riverside and San Bernardino Counties would increase from 14 to 20 percent.
GMA-High	Los Angeles County would experience the greatest absolute increase, growing by 3.12 million (40 percent). This increase represents 40 percent of the total population growth projected regionwide by 2010. San Bernardino, Riverside, and Orange Counties would claim 20, 18, and 15 percent of projected regional growth, respectively. The largest proportional increases would occur in Riverside and San Bernardino Counties (188 and 156 percent, respectively). This trend would generally result in an eastward shift in the region's population distribution, as the proportion of all persons living in Los Angeles County would decline from 64 to 54 percent and the proportion living in Riverside and San Bernardino Counties would increase from 14 to 24 percent.

Alternative	Subregional Projections and Trends (Housing)
Proposed Project (GMA-4 Modified)	Housing growth would follow population patterns, but would outpace population growth because of declining average household size. The housing stock of urbanizing areas would experience the greatest absolute increase, growing by 1.21 million units (121 percent). This increase represents 45 percent of the total housing growth projected regionwide by 2010. The largest proportional increase would occur in mountain/desert areas, where the housing stock would increase by 531,000 units (168 percent). The proportion of the region's housing stock located in urbanized areas would decline from 72 to 58 percent, while the comparable proportions for urbanizing and mountain/desert areas would increase from 22 to 30 percent and from 6 to 12 percent, respectively.
GMA-1 (No Project Alternative)	Housing growth would follow population patterns, but would outpace population growth because of declining average household size. The housing stock of urbanizing areas would experience the greatest absolute increase, growing by 1.33 million units (133 percent). This increase represents 50 percent of the total housing growth projected regionwide by 2010. The largest proportional increase would occur in mountain/desert areas, where the housing stock would increase by 481,000 units (152 percent). The proportion of the region's housing stock located in urbanized areas would decline from 72 to 57 percent, while the comparable proportions for urbanizing and mountain/desert areas would increase from 22 to 32 percent and from 6 to 11 percent, respectively.
GMA-2	Housing growth would follow population patterns, but would outpace population growth because of declining average household size. The housing stock of urbanizing areas would experience the greatest absolute increase, growing by 1.27 million units (127 percent). This increase represents 48 percent of the total housing growth projected regionwide by 2010. The largest proportional increase would occur in mountain/desert areas, where the housing stock would increase by 423,000 units (134 percent). The proportion of the region's housing stock located in urbanized areas would decline from 72 to 59 percent, while the comparable proportions for urbanizing and mountain/desert areas would increase from 22 to 31 percent and from 6 to 10 percent, respectively.
GMA-3	Housing growth would follow population patterns, but would outpace population growth because of declining average household size. The housing stock of urbanizing areas would experience the greatest absolute increase, growing by 1.30 million units (160 percent). This increase represents 49 percent of the total housing growth projected regionwide by 2010. The largest proportional increase would occur in mountain/desert areas, where the housing stock would grow by 506,000 units (160 percent). The proportion of the region's housing stock located in urbanized areas would decline from 72 to 57 percent, while the comparable proportions for urbanizing and mountain/desert areas would increase from 22 to 32 percent and from 6 to 11 percent, respectively.
GMA-4	Housing growth would follow population patterns, but would outpace population growth because of declining average household size. The housing stock of urbanizing areas would experience the greatest absolute increase, growing by 1.25 million units (125 percent). This increase represents 47 percent of the total housing growth projected regionwide by 2010. The largest proportional increase would occur in mountain/desert areas, where the housing stock would increase by 491,000 units (155 percent). The proportion of the region's housing stock located in urbanized areas would decline from 72 to 58 percent, while the comparable proportions for urbanizing and mountain/desert areas would increase from 22 to 31 percent and from 6 to 11 percent, respectively.
GMA-Low	Housing growth would follow population patterns, but would substantially outpace population growth because of declining average household size. The housing stock of urbanizing areas would experience the greatest absolute increase, growing by 1.14 million units (114 percent). This increase represents 45 percent of the total housing growth projected regionwide by 2010. The largest proportional increase would occur in mountain/desert areas, where the housing stock would increase by 501,000 units (159 percent). The proportion of the region's housing stock located in urbanized areas would decline from 72 to 59 percent, while the comparable proportions for urbanizing and mountain/desert areas would increase from 22 to 30 percent and from 6 to 11 percent, respectively.
GMA-High	Housing growth would follow population patterns, but would outpace population growth because of declining average household size. The housing stock of urbanizing areas would experience the greatest absolute increase, growing by 1.58 million units (158 percent). This increase represents 46 percent of the total housing growth projected regionwide by 2010. The largest proportional increase would occur in mountain/desert areas, where the housing stock would increase by 695,000 units (219 percent). The proportion of the region's housing stock located in urbanized areas would decline from 72 to 56 percent, while the comparable proportions for urbanizing and mountain/desert areas would increase from 22 to 32 percent and from 6 to 12 percent, respectively.

Alternative	County Projections and Trends (Housing)
Proposed Project (GMA-4 Modified)	The largest absolute increases in numbers of housing units would occur in Los Angeles County (1.04 million), San Bernardino County (564,000), Riverside County (483,000), and Orange County (432,000). The rate of housing development is expected to generally follow but slightly exceed that of population growth in most counties. As with population, the largest proportional growth of the housing stock is expected in Riverside County (148 percent) and San Bernardino County (138 percent). The Los Angeles County housing stock would grow most slowly (35 percent), with the proportion of the region's housing located in Los Angeles County declining from 63 to 54 percent. In contrast, the percentage of regional housing located in Riverside and San Bernardino Counties would increase from 16 to 24 percent.
GMA-1 (No Project Alternative)	The largest absolute increases in numbers of housing units would occur in Los Angeles County (912,000), Riverside County (566,000), San Bernardino County (562,000), and Orange County (464,000). The rate of housing development is expected to generally follow but slightly exceed that of population growth in most counties. As with population, the largest proportional growth of the housing stock is expected in Riverside County (174 percent) and San Bernardino County (137 percent). The Los Angeles County housing stock would grow most slowly (31 percent), with the proportion of the region's housing located in Los Angeles County declining from 63 to 52 percent. In contrast, the percentage of regional housing located in Riverside and San Bernardino Counties would increase from 16 to 25 percent.
GMA-2	The largest absolute increases in numbers of housing units would occur in Los Angeles County (1.00 million), San Bernardino County (510,000), Riverside County (507,000), and Orange County (487,000). The rate of housing development is expected to generally follow but slightly exceed that of population growth in most counties. As with population, the largest proportional growth of the housing stock is expected in Riverside County (149 percent) and San Bernardino County (124 percent). The Los Angeles County housing stock would grow most slowly (34 percent), with the proportion of the region's housing located in Los Angeles County declining from 63 to 54 percent. In contrast, the proportion of regional housing located in Riverside and San Bernardino Counties would increase from 16 to 24 percent.
GMA-3	The largest absolute increases in numbers of housing units would occur in Los Angeles County (964,000), Riverside County (603,000), and San Bernardino County (595,000). The rate of housing development is expected to generally follow but slightly exceed that of population growth in most counties. As with population, the largest proportional growth of the housing stock is expected in Riverside County (185 percent) and San Bernardino County (146 percent). The housing stock of Los Angeles County and Orange County would grow most slowly (33 and 45 percent, respectively) and the proportion of the region's housing located in these two counties would decline from 79 to 67 percent. In contrast, the proportion of regional housing located in Riverside and San Bernardino Counties would increase from 16 to 27 percent.
GMA-4	The largest absolute increases in housing units would occur in Los Angeles County (1.01 million), San Bernardino County (526,000), and Riverside County (526,000). The rate of housing development is expected to generally follow but slightly exceed that of population growth in most counties. As with population, the largest proportional growth of the housing stock is expected in Riverside County (161 percent) and San Bernardino County (129 percent). The housing stock of Los Angeles and Orange Counties would grow most slowly (34 and 57 percent, respectively) and the proportion of the region's housing located in these two counties would decline from 79 to 70 percent. In contrast, the proportion of regional housing located in Riverside and San Bernardino Counties would increase from 16 to 25 percent.

Alternative	County Projections and Trends (Housing)
GMA-Low	The largest absolute increases in housing units would occur in Los Angeles County (960,000), San Bernardino County (526,000), and Riverside County (451,000). The rate of housing development is expected to substantially exceed that of population growth in most counties. As with population, the largest proportional growth of the housing stock is expected in Riverside County (138 percent) and San Bernardino County (129 percent). The housing stock of Los Angeles and Orange Counties would grow most slowly (33 and 55 percent, respectively) and the proportion of the region's housing located in these two counties would decline from 79 to 71 percent. In contrast, the proportion of regional housing located in Riverside and San Bernardino Counties would increase from 16 to 24 percent.
GMA-High	The largest absolute increases in housing units would occur in Los Angeles County (1.32 million), San Bernardino County (741,000), and Riverside County (635,000). The rate of housing development is expected to substantially exceed that of population growth in most counties. As with population, the largest proportional growth of the housing stock is expected in Riverside County (195 percent) and San Bernardino County (181 percent). The housing stock of Los Angeles and Orange Counties would grow most slowly (45 and 72 percent, respectively) and the proportion of the region's housing located in these two counties would decline from 79 to 69 percent. In contrast, the proportion of the regional housing stock located in Riverside and San Bernardino Counties would increase from 16 to 26 percent.

Alternative	Subregional Projections and Trends (Employment)
Proposed Project (GMA-4 Modified)	The greatest absolute increase in employment would occur in urbanized areas, with the number of jobs growing by 1.38 million (30 percent). This increase would represent 46 percent of the total employment growth projected regionwide by 2010. However, the proportion of regional employment based in urbanized areas would decrease from 79 to 67 percent. Employment would increase by 1.28 million (121 percent) in urbanizing and by 369,000 (184 percent) in mountain/desert areas. Under this alternative, employment growth is expected to exceed housing growth in urbanized areas and to lag behind housing growth in urbanizing and mountain/desert areas. On average, employment in urbanized areas would increase by 149 jobs for every increase of 100 housing units in those areas, while employment in urbanizing and mountain/desert areas, respectively, would increase by 106 and 69 jobs per 100 housing units. Regional unemployment would equal 5.5 percent.
GMA-1 (No Project Alternative)	The greatest absolute increase in employment would occur in urbanized areas, with the number of jobs growing by 1.72 million (37 percent). This increase represents 57 percent of the total employment growth projected regionwide by 2010. However, the proportion of regional employment based in urbanized areas would decrease from 79 to 71 percent. Employment in urbanizing and mountain/desert areas would more than double, growing to 2.16 million and 418,000 jobs, respectively. Under this alternative, employment growth is expected to exceed housing growth in urbanized areas and to lag behind housing growth in urbanizing and mountain/desert areas. On average, employment in urbanized areas would increase by 201 jobs for every increase of 100 housing units in those areas, while employment in urbanizing and mountain/desert areas, respectively, would increase by 82 and 45 jobs per 100 housing units. Regional unemployment would equal 5.5 percent.
GMA-2	The greatest absolute increase in employment would occur in urbanized areas, with the number of jobs growing by 1.43 million (31 percent). This increase represents 47 percent of the total employment growth projected regionwide by 2010. However, the proportion of regional employment based in urbanized areas would decrease from 79 to 68 percent. Employment in urbanizing and mountain/desert areas would more than double, growing to 2.41 million and 444,000 jobs, respectively. Under this alternative, employment growth is expected to exceed housing growth in urbanized and urbanizing areas, but to lag behind housing growth in mountain/desert areas. On average, employment in urbanized and urbanizing areas would increase by 147 and 106 jobs for every increase of 100 housing units in those areas, while employment in mountain/desert areas would increase by an average of 58 jobs per 100 additional housing units. Regional unemployment would equal 5.5 percent.
GMA-3	The greatest absolute increase in employment would occur in urbanized areas, with the number of jobs growing by 1.50 million (32 percent). This increase represents 49 percent of the total employment growth projected regionwide by 2010. However, the proportion of regional employment based in urbanized areas would decrease from 79 to 69 percent. Employment in urbanizing and mountain/desert areas would more than double, growing to 2.30 million and 491,000 jobs, respectively. Under this alternative, employment growth is expected to exceed housing growth in urbanized areas, but to lag behind housing growth in urbanizing and mountain/desert areas. On average, employment in urbanized areas would increase by 172 new jobs for every increase in 100 new housing units in those areas, while employment in urbanizing and mountain/desert areas would increase by 96 and 57 jobs, respectively, per 100 housing units. Regional unemployment would equal 5.5 percent.
GMA-4	The greatest absolute increase in employment would occur in urbanized areas, with the number of jobs growing by 1.42 million (32 percent). This increase represents 47 percent of the total employment growth projected regionwide by 2010. However, the proportion of regional employment based in urbanized areas would decrease from 79 to 68 percent. Employment would more than double to 2.20 million jobs in urbanizing areas and more than triple to 654,000 jobs in mountain/desert areas. Under this alternative, employment growth is expected to exceed housing growth in urbanized areas, but to lag behind housing growth in mountain/desert and urbanizing areas. On average, employment in urbanized areas would increase by 156 jobs for every 100 additional housing units, while employment in urbanizing and mountain/desert areas would increase by an average of 92 and 91 jobs, respectively, per 100 additional housing units.

Alternative	Subregional Projections and Trends (Employment)
GMA-Low	The greatest absolute increase in employment would occur in urbanized areas, with the number of jobs growing by 1.28 million (27 percent). This increase represents 46 percent of the total employment growth projected regionwide by 2010. However, the proportion of regional employment based in urbanized areas would decrease from 79 to 68 percent. Employment would more than double to 2.25 million jobs in urbanizing areas and would increase by 171 percent to 545,000 jobs in mountain/desert areas. Under this alternative, employment growth is expected to exceed housing growth in urbanized and urbanizing areas, but to lag behind housing growth in mountain/desert areas. On average, employment in urbanized and urbanizing areas would increase by 142 and 105 jobs, respectively, for every 100 additional housing units, while employment in mountain/desert areas would increase by an average of 67 jobs per 100 additional housing units.
GMA-High	The greatest absolute increase in employment would occur in urbanized areas, with the number of jobs growing by 1.48 million (32 percent). This increase represents 44 percent of the total employment growth projected regionwide by 2010. However, the proportion of regional employment based in urbanized areas would decrease from 79 to 66 percent. Employment would more than double to 2.52 million jobs in urbanizing areas and would more than triple to 628,000 jobs in mountain/desert areas. Under this alternative, employment growth is expected to exceed housing growth in urbanized areas, but to lag behind housing growth in mountain/desert and urbanizing areas. On average, employment in urbanized areas would increase by 137 jobs for every 100 additional housing units, while employment in urbanizing and mountain/desert areas would increase by an average of 98 and 62 jobs, respectively, per 100 additional housing units. Regional unemployment would equal 11 percent.

Alternative	County Projections and Trends (Employment)
Proposed Project (GMA-4 Modified)	The largest absolute increases in jobs would occur in Los Angeles County (1.36 million) and Orange County (644,000). Los Angeles County would continue to generate the majority of regional employment, but it would experience the lowest job growth rate (34 percent); the county's proportion of all jobs in the region would decline from 68 to 60 percent. Employment growth rates would be greatest in Riverside County (154 percent), San Bernardino County (143 percent), and Orange County (61 percent). The proportion of regional employment located in these three counties would increase from 27 to 35 percent. Employment growth is projected to exceed housing growth in Imperial, Orange, Los Angeles, and Ventura Counties. On average, employment in these three counties would increase by 155, 149, 132, and 113 jobs, respectively, for every increase of 100 housing units in these counties. Employment growth would lag behind housing development in other counties, increasing by an average of 82 and 79 jobs per 100 housing units, respectively, in San Bernardino and Riverside Counties.
GMA-1 (No Project Alternative)	The largest absolute increases in jobs would occur in Los Angeles County (1.47 million) and Orange County (872,000). Los Angeles County would continue to generate the majority of regional employment, but it would experience the lowest job growth rate (36 percent); the county's proportion of all jobs in the region would decline from 68 to 62 percent. Employment growth rates would be greatest in San Bernardino County (97 percent), Riverside County (89 percent), and Orange County (83 percent). The proportion of regional employment located in these three counties would increase from 27 to 33 percent. Employment growth is projected to exceed housing growth in Orange, Los Angeles, and Imperial Counties. On average, employment in these three counties would increase by 188, 161, and 104 jobs, respectively, for every increase of 100 housing units in these counties. Employment growth would lag behind housing development in other counties, increasing by an average of 91, 56, and 39 jobs per 100 housing units, respectively, in Ventura, San Bernardino, and Riverside Counties.
GMA-2	The largest absolute increases in jobs would occur in Los Angeles County (1.29 million) and Orange County (751,000). Los Angeles County would continue to generate the majority of regional employment, but it would experience the lowest job growth rate (32 percent) and the county's proportion of all jobs in the region would decline from 68 to 60 percent. Employment growth rates would be greatest in Riverside County (146 percent) and San Bernardino County (137 percent). The proportion of regional employment located in these two counties would increase from 9 to 16 percent. Employment growth is projected to exceed housing growth in Orange, Los Angeles, Ventura, and Imperial Counties. On average, employment in these counties would increase by 148, 129, 111, and 104 jobs, respectively, for every additional 100 housing units. Employment growth would lag behind housing development in San Bernardino County and Riverside County, where employment would increase by an average of 87 and 74 jobs, respectively, per 100 additional housing units.
GMA-3	The largest absolute increases in jobs would occur in Los Angeles County (1.50 million). Los Angeles County would continue to generate the majority of regional employment, but it would experience the lowest job growth rate (37 percent) and the county's proportion of all jobs in the region would decline from 68 to 62 percent. Orange County would also have a low job growth rate. Employment growth rates would be greatest in San Bernardino County (154 percent) and Riverside County (131 percent). The proportion of regional employment located in these two counties would increase from 9 to 15 percent. Employment growth is projected to exceed housing growth in Los Angeles, Orange, and Ventura Counties. On average, employment in these counties would increase by 156, 153, and 114 new jobs, respectively, for every increase of 100 housing units in these counties. Employment growth would lag behind housing development in Imperial, San Bernardino, and Riverside Counties, where employment would increase by an average of 99, 84, and 54 jobs, respectively, per 100 additional housing units.
GMA-4	The largest absolute increase in jobs would occur in Los Angeles County (1.42 million). Los Angeles County would continue to generate the majority of regional employment, but it would experience the lowest job growth rate (35 percent) and the county's proportion of all jobs in the region would decline from 68 to 61 percent. Employment growth rates would be greatest in San Bernardino and Riverside Counties (133 and 128 percent, respectively). The proportion of regional employment located in these two counties would increase from 9 to 14 percent. Employment growth is projected to exceed housing growth in Orange, Los Angeles, Imperial, and Ventura Counties. On average, employment in these counties would increase by 150, 141, 125, and 115 jobs, respectively, for every 100 additional housing units. Employment growth would lag behind housing development in San Bernardino and Riverside Counties, where employment would increase by an average of 82 and 61 jobs, respectively, per 100 additional housing units.

Alternative	County Projections and Trends (Employment)
GMA-Low	The largest absolute increase in jobs would occur in Los Angeles County (1.26 million). Los Angeles County would continue to generate the majority of regional employment, but it would experience the lowest job growth rate (31 percent), and the county's proportion of all jobs in the region would decline from 68 to 61 percent. Employment growth rates would be greatest in Riverside and San Bernardino Counties (143 and 132 percent, respectively). The proportion of regional employment located in these two counties would increase from 9 to 16 percent. Employment growth is projected to exceed housing growth in Orange, Imperial, Los Angeles, and Ventura Counties. On average, employment in these counties would increase by 142, 142, 132, and 110 jobs, respectively, for every 100 additional housing units. Employment growth would lag behind housing development in San Bernardino and Riverside Counties, where employment would increase by an average of 82 and 78 jobs, respectively, per 100 additional housing units.
GMA-High	The largest absolute increase in jobs would occur in Los Angeles County (1.49 million). Los Angeles County would continue to generate the majority of regional employment, but it would experience the lowest job growth rate (37 percent), and the county's proportion of all jobs in the region would decline from 68 to 60 percent. Employment growth rates would be greatest in Riverside and San Bernardino Counties (180 and 166 percent, respectively). The proportion of regional employment located in these two counties would increase from 9 to 17 percent. Employment growth is projected to exceed housing growth in Imperial, Orange, Los Angeles, and Ventura Counties. On average, employment in these counties would increase by 139,125, 113, and 103 jobs, respectively, for every 100 additional housing units. Employment growth would lag behind housing development in San Bernardino and Riverside Counties, where employment would increase by an average of 73 and 70 jobs, respectively, per 100 additional

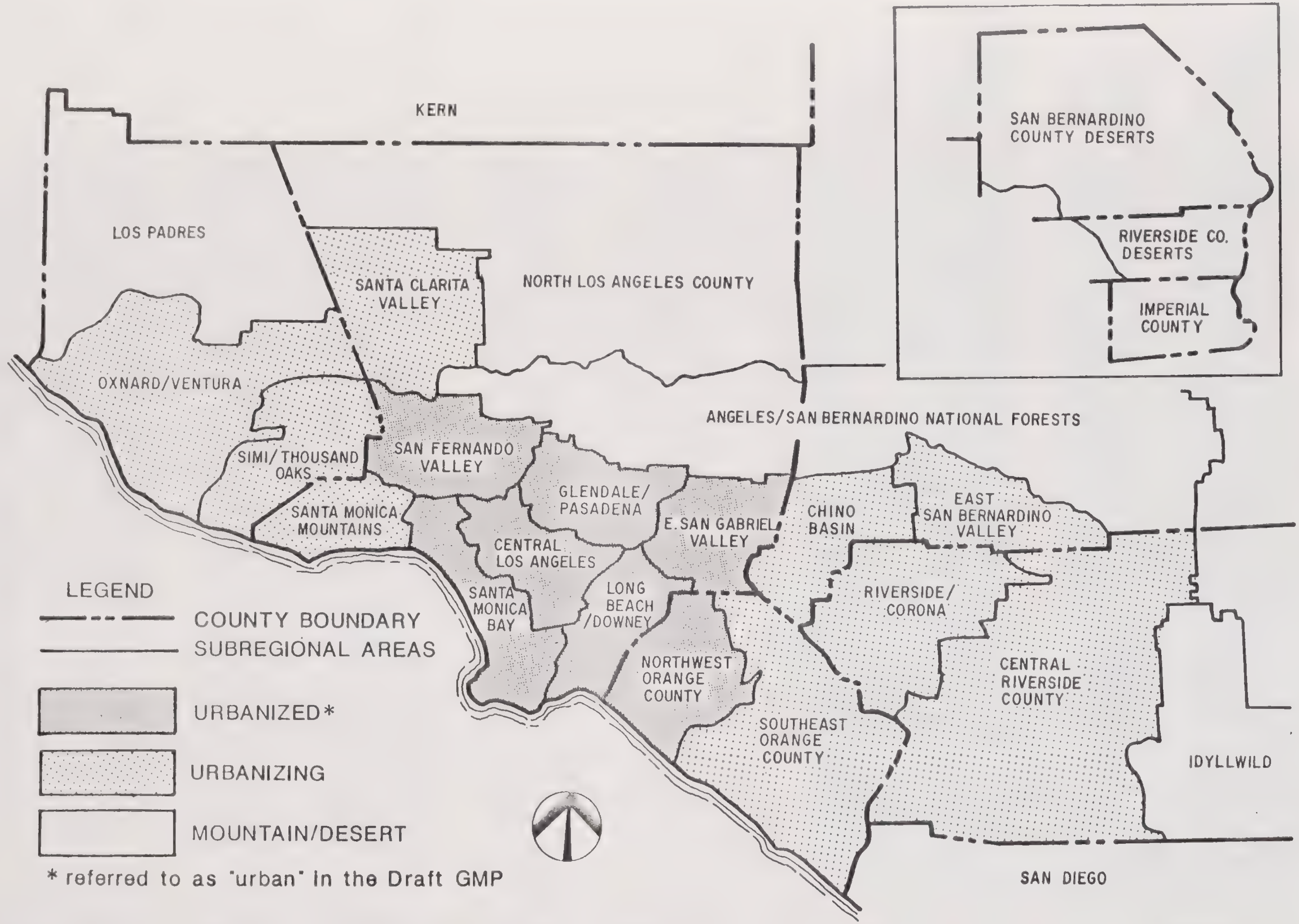


FIGURE 2-2. SUBREGIONAL AREAS

GMA-1: Baseline Projection (No Project Alternative)

This growth projection assumes that demographics and economic trends of the late 1970s and early 1980s would continue to 2010. It reflects the expected effects of current growth management policies (e.g., growth control ordinances adopted by 1987), but assumes that there would be no change in government policies or recent market trends during the planning period.

GMA-2: Jobs/Housing Balance Alternative

This projection assumes that the current imbalance of jobs and housing in the subregions would be reduced by the allocation of future jobs and housing units. Approximately 12 percent of the employment growth expected to occur in the SCAG region between 1984 and 2010 (360,000 jobs) would be redirected from job-rich or housing-poor areas with relatively high J/H ratios (e.g., the urbanized subregion; Los Angeles and Orange Counties) to job-poor or housing-rich areas with relatively low J/H ratios (e.g., the mountain/desert subregion; Riverside and San Bernardino Counties). Approximately 6 percent of projected housing growth during this period (150,000 units) would be redirected from housing-rich to housing-poor areas.

GMA-3: Local Plans Alternative

This alternative was specifically developed in response to forecasts recommended by Orange County that call for lower population and employment growth than that projected under GMA-1. Under this alternative, projected regional increases in population, housing, and employment exceeding these growth objectives were redistributed to other areas within the region on the assumption that local growth constraints would not reduce overall regional growth, which is driven by market forces.

GMA-4: Emerging Futures Alternative

This alternative is based primarily on market trends and public policy decisions since 1984. Like GMA-2, GMA-4 assumes that jobs and housing balance objectives would be achieved within the subregions by 2010 by projecting more employment growth in the mountain-desert area than the other alternatives, but gives greater weight to recent growth pressures, government actions, and trends, primarily telecommuting, that could alter the spatial pattern and impacts of future development.

GMA-Low

This alternative is based on State Department of Finance (DOF) 2010 population projections at the county level. GMA-Low projects a regional population of 17.1 million people, 1.1 million lower than the total forecast under the proposed project. To achieve the lower regional total, all ethnic fertility rates in the SCAG demographic model were reduced. Net migration was not adjusted since both SCAG and DOF assumed similar migration levels. Employment and housing projections were determined based on labor force and household estimates derived from the DOF county population projections. (Southern California Association of Governments 1988j)

GMA-High

This alternative is based on SCAG 2010 population and employment projections that reflect 1983-1987 population growth trends and a higher national economic forecast by the U. S. Bureau of Labor Statistics. GMA-High projects a regional population of 20.2 million people, 1.9 million higher than the total forecast under the proposed project. The region's population would grow at a substantially greater rate than employment under this alternative, resulting in an increase of the regional unemployment rate to approximately 11 percent. (Southern California Association of Governments 1988j)

COMPARISON OF GMA-1 (NO PROJECT ALTERNATIVE) AND OTHER GROWTH MANAGEMENT ALTERNATIVES

Population

Table 2-4 compares county and subregional population growth. Compared with GMA-1, the regional population in 2010 would be 1.12 million lower (6.2 percent) under GMA-Low, 1.94 million higher (10.6 percent) under GMA-High, and the same (18.26 million) under the proposed project and all other alternatives.

Subregional variations with GMA-1 would generally be greatest GMA-Low and GMA-High because of the differences in the regional population totals. The largest proportional reductions in projected 1984-2010 population growth between GMA-1 and GMA-Low would occur in Riverside County (32.1 percent), San Bernardino County (26.2 percent), and the urbanizing subregion (25.8 percent), while population growth would be 8.8 percent greater in Imperial County under GMA-Low than under GMA-1.

The largest proportional increases between GMA-1 and GMA-High would occur in Los Angeles County (49.7 percent), the mountain/desert subregion (49.0 percent), the urbanized subregion (42.8 percent), and Ventura County (38.5 percent), while population growth would be 22.7 percent less in Imperial County under GMA-High than under GMA-1.

Table 2-4. Comparison of 1984-2010 County and Subregion Population Growth Projections Between GMA-1 (No Project) and Other Alternatives

	VENTURA COUNTY	LOS ANGELES COUNTY	ORANGE COUNTY	RIVERSIDE COUNTY	SAN BERNARDINO COUNTY	IMPERIAL COUNTY	URBANIZED SUBREGION	URBANIZING SUBREGION	MOUNTAIN/ DESERT SUBREGION	REGIONAL TOTAL
1984	579,954	7,862,663	2,066,400	757,472	1,014,469	101,732	9,019,165	2,722,480	641,045	12,382,690
Growth, 1984-2010										
GMA-1 (No Project)	329,646	2,086,237	983,800	1,211,828	1,203,731	58,268	1,894,735	3,087,020	891,755	5,873,510
Difference Between GMA-1 and										
Other Alternatives:										
Proposed Project (GMA-4 Modified)	5,600	282,300	(68,000)	(161,200)	(38,900)	(19,800)	159,100	(266,100)	107,000	0
GMA-2	0	203,500	100,800	(182,900)	(121,400)	0	273,600	(160,700)	(112,900)	0
GMA-3	0	75,800	(219,100)	72,200	68,300	2,800	9,000	(49,700)	40,700	0
GMA-4	26,400	217,700	(74,100)	(109,300)	(77,000)	16,300	153,900	(187,200)	33,300	0
GMA-Low	(45,800)	(259,300)	(116,700)	(388,600)	(315,500)	5,100	(324,600)	(765,000)	(31,200)	(1,120,800)
GMA-High	126,900	1,037,200	198,100	214,800	378,100	(13,200)	811,400	693,900	436,600	1,941,900
2010										
GMA-1 (No Project)	909,600	9,948,900	3,050,200	1,969,300	2,218,200	160,000	10,913,900	5,809,500	1,532,800	18,256,200
Difference Between GMA-1 and										
Other Alternatives:										
Proposed Project (GMA-4 Modified)	5,600	282,300	(68,000)	(161,200)	(38,900)	(19,800)	159,100	(266,100)	107,000	0
GMA-2	0	203,500	100,800	(182,900)	(121,400)	0	273,600	(160,700)	(112,900)	0
GMA-3	0	75,800	(219,100)	72,200	68,300	2,800	9,000	(49,700)	40,700	0
GMA-4	26,400	217,700	(74,100)	(109,300)	(77,000)	16,300	153,900	(187,200)	33,300	0
GMA-Low	(45,800)	(259,300)	(116,700)	(388,600)	(315,500)	5,100	(324,600)	(765,000)	(31,200)	(1,120,800)
GMA-High	126,900	1,037,200	198,100	214,800	378,100	(13,200)	811,400	693,900	436,600	1,941,900

In comparing GMA-1 with the other alternatives having an identical regional total, a few areas would have greater differences with GMA-1 than would occur under GMA-Low or GMA-High. The greatest differences in 1984-2010 population growth occur in Orange County (22.7 percent less under GMA-3), Imperial County (34.0 percent less under the proposed project), and the mountain/desert subregion (12.7 percent less under GMA-2).

Housing

Table 2-5 compares county and subregional housing growth. Compared with GMA-1, the regional housing stock in 2010 would be 162,500 units lower (2.2 percent) under GMA-Low, 771,000 higher (10.5 percent) under GMA-High, and the same (7.32 million) under the proposed project and all other alternatives.

Subregional variations with GMA-1 would generally be largest under GMA-Low and GMA-High because of the differences in the regional housing totals. The largest proportional reductions in projected 1984-2010 housing growth between GMA-1 and GMA-Low would occur in Imperial County (22.7 percent), Riverside County (20.3 percent), and the urbanizing subregion (14.6 percent), while housing growth would be 18.3 percent greater in Los Angeles County under GMA-Low than under GMA-1.

The largest proportional increases between GMA-1 and GMA-High would occur in Los Angeles County (62.7 percent), the mountain/desert subregion (44.5 percent), the urbanized subregion (36.6 percent), and San Bernardino County (32.0 percent), while housing growth would be 16.5 percent less in Imperial County under GMA-High than under GMA-1.

In comparing GMA-1 with the other alternatives having an identical regional total, a few areas would have greater differences with GMA-1 than would occur under GMA-Low or GMA-High. The greatest differences in 1984-2010 housing growth would occur in Orange County (26.6 percent less under GMA-3), San Bernardino County (9.3 percent less under GMA-2), Imperial County (28.9 percent less under the proposed project), and the mountain/desert subregion (12.0 percent less under GMA-2). GMA-4 would also yield the largest population increase in Imperial County (23.1 percent more than under GMA-1).

Employment

Table 2-6 compares county and subregional employment growth. Compared with GMA-1, the number of regional jobs in 2010 would be 214,600 lower (2.4 percent) under GMA-Low, 337,000 higher (3.7 percent) under GMA-High, and the same (8.95 million) under the proposed project and all other alternatives.

Subregional variations with GMA-1 would generally be greatest under GMA-Low and GMA-High because of the differences in the regional employment totals. The largest proportional reductions in projected 1984-2010

Table 2-5. Comparison of 1984-2010 County and Subregion Housing Growth Projections Between GMA-1 (No Project) and Other Alternatives

	VENTURA COUNTY	LOS ANGELES COUNTY	ORANGE COUNTY	RIVERSIDE COUNTY	SAN BERNARDINO COUNTY	IMPERIAL COUNTY	URBANIZED SUBREGION	URBANIZING SUBREGION	MOUNTAIN/ DESERT SUBREGION	REGIONAL TOTAL
1984	196,629	2,923,560	760,084	326,040	408,586	33,396	3,331,866	1,000,391	316,038	4,648,295
Growth, 1984-2010										
GMA-1 (No Project)	139,771	811,840	463,716	566,260	561,614	26,004	855,034	1,333,509	480,662	2,669,205
Difference Between GMA-1 and Other Alternatives:										
Proposed Project (GMA-4 Modified)	(4,200)	223,900	(31,900)	(83,000)	2,700	(7,500)	70,200	(120,400)	50,200	0
GMA-2	0	188,700	43,000	(79,700)	(52,000)	0	117,600	(60,100)	(57,500)	0
GMA-3	0	152,000	(123,100)	36,400	33,400	1,300	13,300	(38,200)	24,900	0
GMA-4	4,400	194,900	(28,600)	(40,800)	(35,900)	6,000	70,900	(81,000)	10,100	0
GMA-Low	(10,200)	148,400	(44,100)	(114,900)	(35,800)	(5,900)	11,300	(194,500)	20,700	(162,500)
GMA-High	38,400	508,600	80,000	68,800	179,500	(4,300)	313,100	244,100	213,800	771,000
2010										
GMA-1 (No Project)	336,400	3,835,400	1,223,800	892,300	970,200	59,400	4,186,900	2,333,900	796,700	7,317,500
Difference Between GMA-1 and Other Alternatives:										
Proposed Project (GMA-4 Modified)	(4,200)	123,900	(31,900)	(83,000)	2,700	(7,500)	70,200	(120,400)	50,200	0
GMA-2	0	88,700	43,000	(79,700)	(52,000)	0	117,600	(60,100)	(57,500)	0
GMA-3	0	52,000	(123,100)	36,400	33,400	1,300	13,300	(38,200)	24,900	0
GMA-4	4,400	94,900	(28,600)	(40,800)	(35,900)	6,000	70,900	(81,000)	10,100	0
GMA-Low	(10,200)	48,400	(44,100)	(114,900)	(35,800)	(5,900)	11,300	(194,500)	20,700	(162,500)
GMA-High	38,400	408,600	80,000	68,800	179,500	(4,300)	313,100	244,100	213,800	771,000

Table 2-6. Comparison of 1984-2010 County and Subregion Employment Growth Projections Between GMA-1 (No Project) and Other Alternatives

	VENTURA COUNTY	LOS ANGELES COUNTY	ORANGE COUNTY	RIVERSIDE COUNTY	SAN BERNARDINO COUNTY	IMPERIAL COUNTY	URBANIZED SUBREGION	URBANIZING SUBREGION	MOUNTAIN/ DESERT SUBREGION	REGIONAL TOTAL
1984	213,000	4,053,000	1,048,000	247,000	325,000	37,000	4,663,194	1,059,422	200,384	5,923,000
Growth, 1984-2010										
GMA-1 (No Project)	127,000	1,471,100	872,000	219,000	315,000	27,000	1,715,306	1,098,078	217,716	3,031,100
Difference Between GMA-1 and Other Alternatives:										
Proposed Project (GMA-4 Modified)	25,600	(108,900)	(228,200)	160,500	149,400	1,600	(335,200)	184,000	151,200	0
GMA-2	27,600	(181,100)	(121,200)	143,100	131,600	0	(281,500)	255,800	25,700	0
GMA-3	31,800	27,400	(350,500)	105,500	185,800	0	(218,500)	145,800	72,700	0
GMA-4	38,300	(50,600)	(218,400)	100,300	117,400	13,000	(275,300)	39,700	235,600	0
GMA-Low	16,200	(206,200)	(275,200)	133,400	115,600	1,600	(433,400)	92,100	126,700	(214,600)
GMA-High	55,700	21,400	(193,000)	224,700	225,000	3,200	(234,000)	361,300	209,700	337,000
2010										
GMA-1 (No Project)	340,000	5,524,100	1,920,000	466,000	640,000	64,000	6,378,500	2,157,500	418,100	8,954,100
Difference Between GMA-1 and Other Alternatives:										
Proposed Project (GMA-4 Modified)	25,600	(108,900)	(228,200)	160,500	149,400	1,600	(335,200)	184,000	151,200	0
GMA-2	27,600	(181,100)	(121,200)	143,100	131,600	0	(281,500)	255,800	25,700	0
GMA-3	31,800	27,400	(350,500)	105,500	185,800	0	(218,500)	145,800	72,700	0
GMA-4	38,300	(50,600)	(218,400)	100,300	117,400	13,000	(275,300)	39,700	235,600	0
GMA-Low	16,200	(206,200)	(275,200)	133,400	115,600	1,600	(433,400)	92,100	126,700	(214,600)
GMA-High	55,700	21,400	(193,000)	224,700	225,000	3,200	(234,000)	361,300	209,700	337,000

employment growth between GMA-1 and GMA-Low would occur in the urbanized subregion (31.6 percent) and Orange County (25.3 percent), while employment growth under GMA-Low would be 60.7, 58.2, and 36.7 percent greater in Riverside County, the mountain/desert subregion, and San Bernardino County, respectively, than under GMA-1.

The largest proportional increases between GMA-1 and GMA-High would occur in Riverside County (102.6 percent), the mountain/desert subregion (96.3 percent), San Bernardino County (71.4 percent), Ventura County (43.9 percent), and the urbanizing subregion (32.9 percent), while employment growth under GMA-High would be 22.6 and 13.6 percent less in Los Angeles County and the urbanized region, respectively, than under GMA-1.

In comparing GMA-1 with the other alternatives having an identical regional total, a few areas would have even greater differences with GMA-1 than would occur under GMA-Low or GMA-High. The greatest differences in 1984-2010 employment growth would occur in Los Angeles County (1.9 percent greater under GMA-3) and Imperial County (48.2 percent greater under GMA-4), and Orange County (40.2 percent less under GMA-3).

Jobs/Housing Ratio

The top chart in Table 2-7 compares J/H ratios. The regional J/H ratio would be 0.07 lower (5.7 percent) under GMA-High than under GMA-1, and the same as GMA-1 under the proposed project and all other alternatives. Compared with GMA-1, J/H ratios would generally be lower in Los Angeles and Orange Counties and the urbanized subregion and higher in all other counties and subregions.

The greatest absolute decreases in J/H ratios from GMA-1 levels would occur in Orange County under GMA-High (0.24 less) and GMA-Low (0.17 less). The greatest absolute increases in J/H ratios over GMA-1 levels would occur in Riverside County (0.25 greater) under the proposed project and GMA-Low and in the mountain/desert region (0.29 greater) under GMA-4.

The bottom chart in Table 2-7 compares the projected change in J/H ratios as a percentage of the change required to achieve the 2010 regional ratio. Projections of the changes in subarea J/H ratios from 1984, relative to the 2010 regional J/H ratio, indicate that the proposed project and all other alternatives would have a substantially more positive effect on J/H balance in the region than GMA-1 (which would worsen the existing J/H imbalance in all counties and subregions), except for in Imperial County under GMA-3.

COMPARISON OF GROWTH MANAGEMENT ALTERNATIVES

Population, housing, and employment projections for the proposed project and the six other GMAs are summarized in Tables 2-1, 2-2, and 2-3, respectively. Figure 2-3 presents housing distribution by county and

Table 2-7. Comparisons Between GMA-1 (No Project) and Other Alternatives: Projected 2010 Jobs/Housing Ratios by County and Subregion; Projected Jobs/Housing Ratio Change as a Percentage of the Change Required to Achieve the 2010 Regional Jobs/Housing Ratio (a)

Jobs/Housing Ratios, 2010

	VENTURA COUNTY	LOS ANGELES COUNTY	ORANGE COUNTY	RIVERSIDE COUNTY	SAN BERNARDINO COUNTY	IMPERIAL COUNTY	URBANIZED SUBREGION	URBANIZING SUBREGION	MOUNTAIN/ DESERT SUBREGION	REGIONAL TOTAL
GMA-1	1.01	1.44	1.57	0.52	0.66	1.08	1.52	0.92	0.52	1.22
Difference Between GMA-1 and Other Alternatives:										
Proposed Project (GMA-4 Modified)	0.09	-0.07	-0.15	0.25	0.15	0.19	-0.10	0.13	0.15	0.00
GMA-2	0.08	-0.08	-0.15	0.23	0.18	0.00	-0.11	0.14	0.08	0.00
GMA-3	0.09	-0.01	-0.14	0.09	0.16	-0.02	-0.06	0.08	0.07	0.00
GMA-4	0.10	-0.05	-0.15	0.14	0.15	0.10	-0.09	0.05	0.29	0.00
GMA-Low	0.08	-0.07	-0.17	0.25	0.15	0.15	-0.11	0.13	0.14	0.00
GMA-High	0.05	-0.13	-0.24	0.20	0.09	0.14	-0.16	0.05	0.10	-0.07

Relative Change in Jobs/Housing Ratios, 1984-2010

	VENTURA COUNTY	LOS ANGELES COUNTY	ORANGE COUNTY	RIVERSIDE COUNTY	SAN BERNARDINO COUNTY	IMPERIAL COUNTY	URBANIZED SUBREGION	URBANIZING SUBREGION	MOUNTAIN/ DESERT SUBREGION
GMA-1 (No Project)	-16	-87	-226	-43	-25	5	-139	-48	-13
Difference Between GMA-1 and Other Alternatives:									
Proposed Project (GMA-4 Modified)	49	63	141	51	34	69	83	66	24
GMA-2	45	68	141	46	40	0	85	69	12
GMA-3	52	11	135	19	36	-15	45	39	12
GMA-4	54	41	137	29	33	65	72	25	46
GMA-Low	45	59	162	51	33	98	84	64	23
GMA-High	62	42	149	50	31	144	55	58	22

Note: (a) Positive values for alternatives other than GMA-1 indicate that these alternatives would result in a greater movement toward or a lesser movement away from J/H balance (i.e. subarea J/H ratios would be closer to the 2010 regional J/H ratio) in the specified subareas than that which would occur under GMA-1; the higher a positive value, the greater the difference between GMA-1 and the alternative. Negative values indicate that the alternative would result in a greater movement away from J/H balance than under GMA-1.

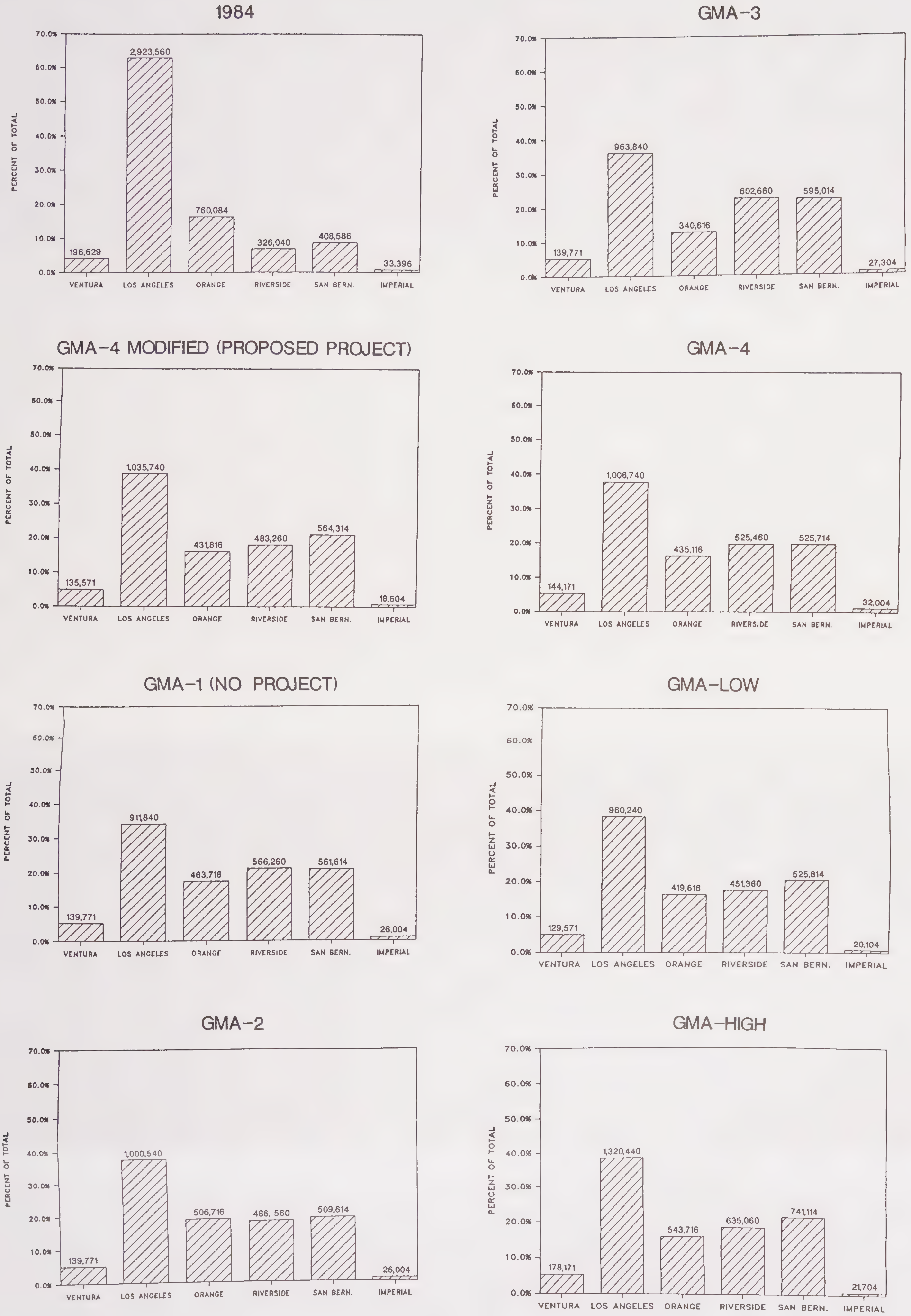


FIGURE 2-3. EXISTING (1984) REGIONAL HOUSING DISTRIBUTION AND PROJECTED (1984-2010) REGIONAL HOUSING GROWTH DISTRIBUTION BY COUNTY FOR PROPOSED PROJECT AND ALTERNATIVES

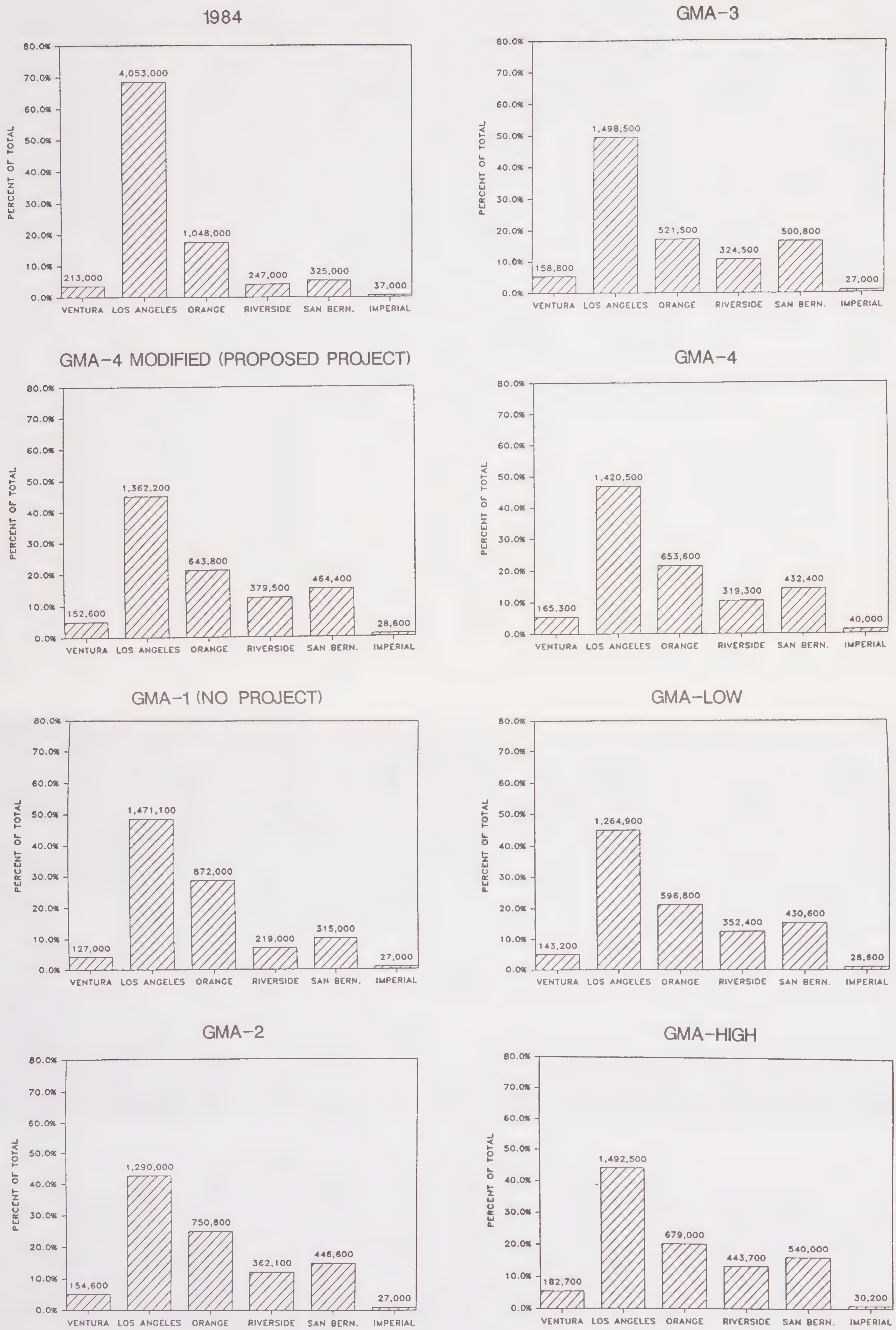


FIGURE 2-4. EXISTING (1984) REGIONAL EMPLOYMENT DISTRIBUTION AND PROJECTED (1984-2010) REGIONAL EMPLOYMENT GROWTH DISTRIBUTION BY COUNTY FOR PROPOSED PROJECT AND ALTERNATIVES

Figure 2-4 presents employment distribution by county under each of the alternatives. The proposed project, GMA-1, GMA-2, GMA-3, and GMA-4 are based on the same regional 2010 totals. GMA-Low and GMA-High are based on lower and higher regional totals, respectively, as described below.

Population

The population of the SCAG region would increase by 4.75-7.82 million (38-63 percent) from 1984 to 2010, according to these alternatives. Under each of the alternatives, the rate of population growth is expected to be highest in urbanizing subregions and lowest in subregions that are urbanized at present. By 2010, nearly one out of every three persons in the region is expected to live in urbanizing subregions, compared to one in five in 1984. The proportion of the population living in subregions that are now urbanized is expected to decline from more than 70 percent to approximately 60 percent. Consistent with this pattern, the population of urbanizing counties such as Riverside and San Bernardino is expected to increase most rapidly, while Los Angeles County (most urbanized) would experience the lowest rate of population growth.

Regionwide population growth projected under GMA-Low is 19 percent less than that under the proposed project. Compared to projections for the proposed project, GMA-Low population estimates are 25 percent, 18, and 14 percent lower for the urbanized, urbanizing, and mountain/desert subregions, respectively. GMA-Low projections are 22-24 percent lower for Los Angeles, Riverside, and San Bernardino Counties; 5 percent lower for Orange County; and 64 percent higher for Imperial County.

Regionwide population growth projected under GMA-High is 33 percent greater than that under the proposed project. Compared to projections for the proposed project, GMA-High population estimates are 32-34 percent lower for subregional areas and 36 percent lower in all counties except Los Angeles County (32 percent), Orange County (29 percent), and Imperial County (17 percent).

Among alternatives other than GMA-Low and GMA-High, the proposed project would generate the greatest population in Los Angeles County, GMA-2 would generate the greatest population in Orange County, GMA-3 would generate the greatest population in Riverside and San Bernardino Counties, and GMA-4 would generate the greatest population in Ventura and Imperial Counties.

Housing

SCAG projects an increase of 2.51-3.44 million (54-74 percent) in the number of housing units within the region between 1984 and 2010. Under all alternatives, housing development is expect to generally follow the growth pattern described for regional population. Approximately one out of every four housing units would be located in Riverside County or San Bernardino County by 2010, compared to only one out of six in 1984.

Housing growth projected under GMA-Low is 6 percent less than that under the proposed project for the region and the urbanized, urbanizing, and mountain/desert subregional areas. GMA-Low projections are 3-7 percent lower for all counties except for Imperial County, where there would be 9 percent more jobs.

Regionwide housing growth projected under GMA-High is 29 percent greater than that under the proposed project. Compared to projections for the proposed project, GMA-High population estimates are 26-31 percent lower for subregional areas and 31 percent lower in all counties except Los Angeles County (27 percent), Orange County (26 percent), and Imperial County (17 percent).

Among alternatives other than GMA-Low and GMA-High, the proposed project would generate the most housing in Los Angeles County, GMA-2 would generate the most housing in Orange County, GMA-3 would generate the most housing in Riverside and San Bernardino Counties, and GMA-4 would generate the most housing in Ventura and Imperial Counties.

Employment

Regional employment would increase by 2.82-3.37 million jobs (48-57 percent). Under all alternatives, employment would generally become more decentralized as urbanizing and mountain/desert subregions experience the highest job growth rates; Los Angeles County, where approximately two out of every three jobs in the region are now located, would see its share of regional employment fall as low as 60 percent.

Employment growth projected under GMA-Low is 7 percent less than that under the proposed project for the region and the urbanized, urbanizing, and mountain/desert subregions. GMA-Low projections are 7 percent lower for all counties except for Ventura County (6 percent less) and Imperial County (no change).

Regionwide employment growth projected under GMA-High is 11 percent greater than that under the proposed project. Compared to projections for the proposed project, GMA-High employment estimates are 7, 14, and 16 percent higher, respectively, for the urbanized, urbanizing, and mountain/desert areas. GMA-Low projections are 16-20 percent greater in all counties except Los Angeles County (10 percent higher), Orange County (5 percent higher), and Imperial County (6 percent higher).

Among alternatives other than GMA-Low and GMA-High, the proposed project would generate the most employment in Riverside County, GMA-1 would generate the most employment in Orange County, GMA-3 would generate the most employment in Los Angeles and San Bernardino Counties, and GMA-4 would generate the most employment in Ventura and Imperial Counties.

Household Size

Regional and subregional household size assumptions for 1984 and 2010 (existing conditions and the proposed project and alternatives) are presented in Table 2-8. These assumptions are based on vacancy rate assumptions shown in Table 2-8 and summarized below.

Under all alternatives, average household size in the region would decline from 1984 levels. The regional average of 2.83 is expected to fall by 5-9 percent, from 2.83 to 2.58-2.69. Decreases in household size would be smaller in the urbanized subregion than in the urbanizing and mountain/desert areas.

Under the proposed project, household size would decrease by 8-9 percent in the mountain/desert and urbanizing subregions, and by 3 percent in the urbanized subregion. Households would be smaller under GMA-Low than under the proposed project and other alternatives because of lower fertility rates.

Housing Vacancy Rates

Housing vacancy rates are expected to generally increase from 1984 under the proposed project and all other alternatives as a result of housing development and changes in subregional housing markets. Regionwide, 7.2 percent of all units would be classified as vacant in 2010, compared to 6.0 percent in 1984.

The overall vacancy rate in the urbanized subregional area, which has historically been low, is projected to increase from 3.6 to 4.2-4.6 percent. The overall vacancy rate in the urbanizing subregional area would remain relatively stable at 5.8-6.3 percent, while those in the mountain/desert area would decline from 28.3 percent to 24.4-25.2 percent. Vacancy rates include second homes that are occupied for part of the year, as noted in Table 2-8.

Jobs/Housing Ratios

J/H ratios under existing conditions, the proposed project, and all other alternatives are presented in Table 2-9. Comparisons between subregional and county J/H ratios and regional J/H ratios for 1984 and 2010 are shown in Figures 2-5 and 2-6, respectively. Table 2-10 present measures of J/H ratios by subregion and county for each alternative as they relate to the 2010 regional J/H ratio.

The regional J/H ratio is expected to decline from 1.27 (1984) to 1.22 (2010) under all alternatives except GMA-High, because of a greater proportional increase in housing units than in employment. The regional J/H ratio for GMA-High would be lower at 1.15 because employment growth is projected to lag behind population and housing growth under this alternative.

Table 2-8. Average Household Size (Persons Per Occupied Dwelling Unit) and Housing Vacancy Rates (a) by Subregional Area, 1984-2010, Under Existing Conditions, Proposed Project, and Alternatives

	HOUSEHOLD SIZE				VACANCY RATES			
	URBANIZED SUBREGION	URBANIZING SUBREGION	MOUNTAIN/ DESERT SUBREGION	REGIONAL TOTAL	URBANIZED SUBREGION	URBANIZING SUBREGION	MOUNTAIN/ DESERT SUBREGION	REGIONAL TOTAL
1984	2.81	2.89	2.83	2.83	3.6	6.0	28.3	6.0
2010								
Proposed Project (GMA-4 Modified)	2.72	2.66	2.57	2.69	4.4	6.0	24.7	7.2
Alternatives								
GMA-1 (No Project)	2.73	2.65	2.57	2.69	4.4	6.2	25.1	7.2
GMA-2	2.72	2.65	2.57	2.69	4.6	6.3	25.2	7.2
GMA-3	2.72	2.68	2.55	2.69	4.3	6.2	24.8	7.2
GMA-4	2.72	2.66	2.57	2.69	4.5	6.1	24.5	7.2
GMA-Low	2.64	2.51	2.44	2.58	4.4	6.0	24.8	7.2
GMA-High	2.72	2.68	2.58	2.69	4.2	5.8	24.4	7.2

Source: Doche-Boulos, pers. comm.

Note: (a) Vacancy estimates include second homes that are occupied for part of the year.

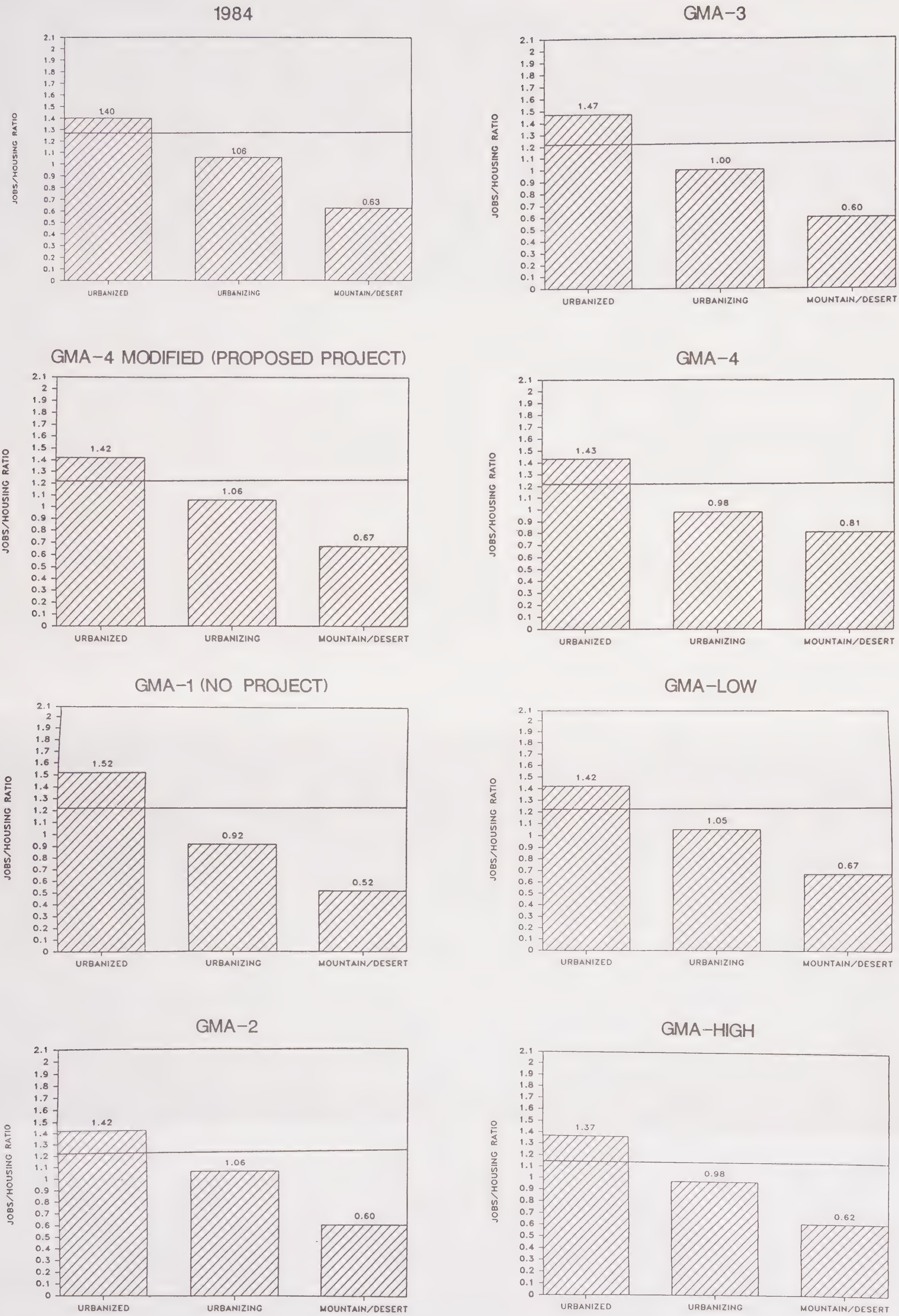
Table 2-9. Jobs/Housing Ratios by County and Subregion, Under Existing Conditions (1984), Proposed Project, and Alternatives

	VENTURA COUNTY	LOS ANGELES COUNTY	ORANGE COUNTY	RIVERSIDE COUNTY	SAN BERNARDINO COUNTY	IMPERIAL COUNTY	URBANIZED SUBREGION	URBANIZING SUBREGION	MOUNTAIN/ DESERT SUBREGION	REGIONAL TOTAL
1984	1.08	1.39	1.38	0.76	0.80	1.11	1.40	1.06	0.63	1.27
2010										
Proposed Project (GMA-4 Modified)	1.10	1.37	1.42	0.77	0.81	1.26	1.42	1.06	0.67	1.22
Alternatives										
GMA-1 (No Project)	1.01	1.44	1.57	0.52	0.66	1.08	1.52	0.92	0.52	1.22
GMA-2	1.09	1.36	1.42	0.75	0.84	1.08	1.42	1.06	0.60	1.22
GMA-3	1.11	1.43	1.43	0.62	0.82	1.05	1.47	1.00	0.60	1.22
GMA-4	1.11	1.39	1.42	0.67	0.81	1.18	1.43	0.98	0.81	1.22
GMA-Low	1.09	1.37	1.39	0.77	0.81	1.23	1.42	1.05	0.67	1.22
GMA-High	1.06	1.31	1.32	0.72	0.75	1.22	1.37	0.98	0.62	1.15

Table 2-10. Change in Jobs/Housing Ratios, 1984-2010, as a Percentage of the Change Required to Achieve the 2010 Regional Jobs/Housing Ratio (a)

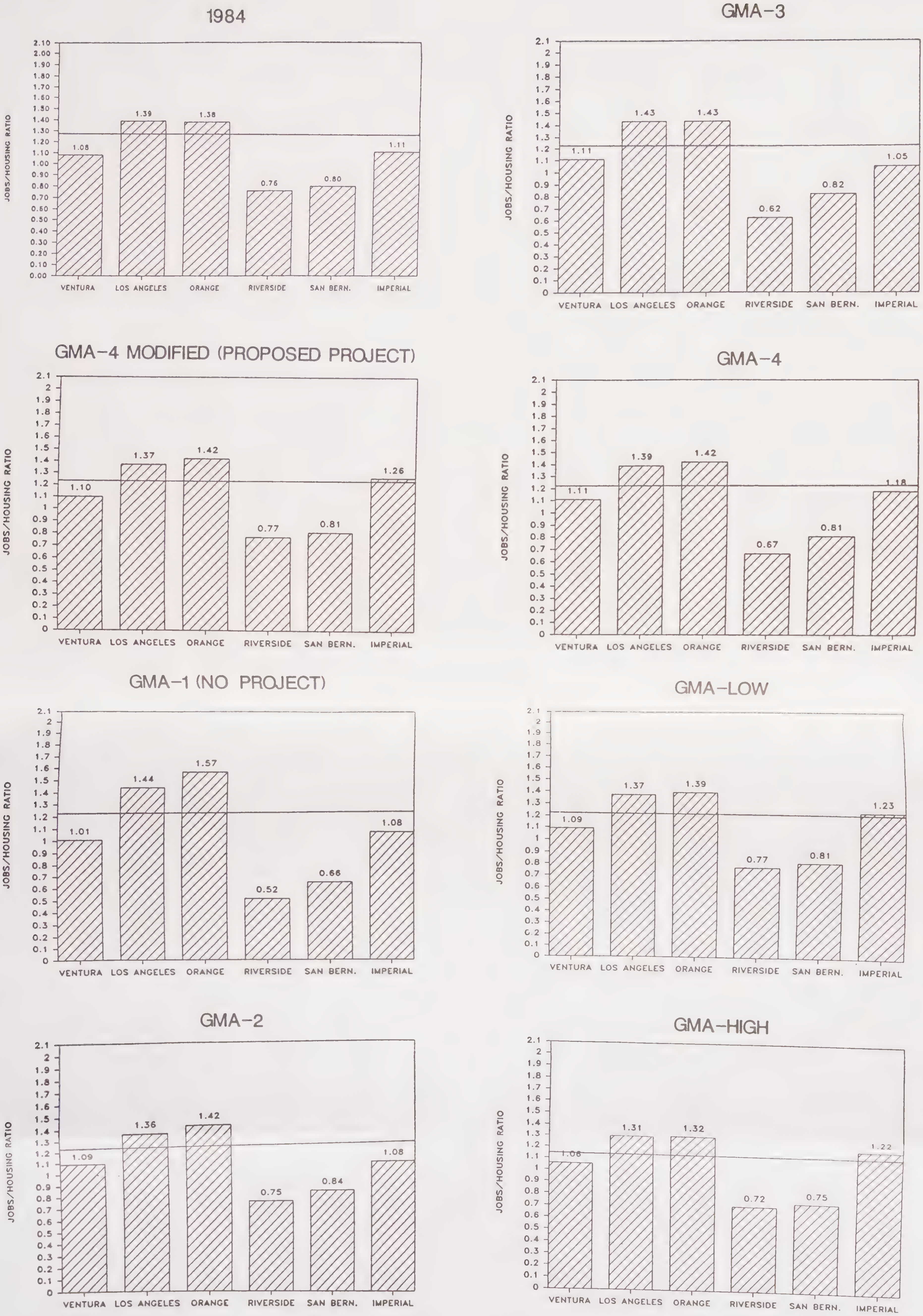
	VENTURA COUNTY	LOS ANGELES COUNTY	ORANGE COUNTY	RIVERSIDE COUNTY	SAN BERNARDINO COUNTY	IMPERIAL COUNTY	URBANIZED SUBREGION	URBANIZING SUBREGION	MOUNTAIN/ DESERT SUBREGION
Proposed Project (GMA-4 Modified)	33	-25	-85	9	9	74	-56	18	11
Alternatives									
GMA-1 (No Project)	-16	-87	-226	-43	-25	5	-139	-48	-13
GMA-2	28	-19	-85	4	15	5	-54	21	-1
GMA-3	35	-77	-91	-24	11	-10	-94	-9	-2
GMA-4	38	-46	-89	-14	9	70	-67	-23	33
GMA-Low	29	-28	-63	8	9	103	-56	16	10
GMA-High	46	-46	-77	7	7	149	-84	10	9

Notes: (a) Positive values of 100 or less indicate percentage of movement toward the projected 2010 regional jobs/housing (J/H) ratio relative to 1984 (e.g., a rating of "100" for a given subarea would indicate that the 2010 J/H ratio would be fully achieved in that subarea and "0" would indicate that no improvement is expected to occur in the J/H ratio of that subarea relative to the 2010 regional J/H ratio). Negative values and positive values of greater than 100 indicate movement away from the regional ratio (e.g., a "-100" rating for a subarea would indicate that the subarea J/H ratio would be twice as far from (above or below) the regional J/H ratio in 2010 as it was in 1984).



(Horizontal line represents regional jobs/housing ratio)

FIGURE 2-5. EXISTING (1984) AND FUTURE (2010) JOB/HOUSING RATIOS BY SUBREGION, PROPOSED PROJECT AND ALTERNATIVES



(Horizontal line represents regional jobs/housing ratio)

FIGURE 2-6. EXISTING (1984) AND FUTURE (2010) JOBS/HOUSING RATIOS BY COUNTY, PROPOSED PROJECT AND ALTERNATIVES

Overall, the proposed project and GMA-2 have similar impacts in terms of J/H balance and the environmental impacts associated with J/H, such as vehicle miles traveled, vehicle hours traveled, delay, and air quality. The greatest differences between the proposed project and GMA-2 occur in Imperial County and the mountain/desert subregion; in both areas, the proposed project would do more to improve the J/H balance than GMA-2.

The proposed project would greatly improve the J/H imbalance projected under GMA-1. As compared to GMA-1, the proposed project would lessen the imbalance in all SCAG counties, except Imperial County, and in the three subregions.

The J/H imbalance would be most adversely affected by GMA-1, which would substantially widen the existing disparity between job-rich and job-poor subareas by increasing J/H ratios in the former (e.g., Los Angeles County, Orange County, and the urbanized subregion) and decreasing these ratios in the latter (e.g., Riverside County, San Bernardino County, and the urbanizing and mountain/desert subregions).

GMA-3, GMA-4, GMA-Low, and GMA-High would result in greater imbalance within the region, than under the proposed project, although the resulting imbalance would still be considerably less than that which would occur under GMA-1.

CHAPTER 3. SUMMARY OF FINDINGS

This section contains a brief project description, a description of the alternatives to the proposed project, a summary of impacts and mitigation measures associated with the proposed project, and impact conclusions, as required by CEQA.

PROJECT DESCRIPTION

The Draft GMP defines seven GMAs by population (Table 2-1), housing (Table 2-2), and employment (Table 2-3) at the regional, subregional (urbanized, urbanizing, and mountain/desert), and county level:

- o preferred alternative or proposed project (GMA-4 Modified),
- o GMA-1 or baseline projection (No Project Alternative),
- o GMA-2 or J/H balance alternative,
- o GMA-3 or local plans alternative,
- o GMA-4 or emerging futures alternative,
- o GMA-Low, and
- o GMA-High.

Regional population is forecast at 17.1-20.2 million, regional housing at 7.2-8.1 million, and regional employment at 8.7-9.3 million under these alternatives. Regional totals for the preferred alternative, GMA-1, GMA-2, GMA-3, and GMA-4 are equivalent; growth within the region has been distributed differently among three subregions and among counties under these alternatives based on certain planning assumptions. GMA-Low has 19 percent less population projected than these alternatives, 6 percent less housing, and 7 percent less employment. GMA-High has 33 percent more population, 29 percent more housing, and 11 percent more employment. The GMAs are described briefly below and in detail in Chapter 2.

Proposed Project (Preferred Alternative)

The proposed project was developed in three steps: 1) the existing baseline projection (GMA-1) was modified to develop a "trend" projection, 2) subregional housing and employment growth were adjusted to balance housing and jobs, and 3) the population forecast was developed.

To develop the trend projection, housing and employment trends were analyzed from 1970 to 1988, giving more weight to the most recent years (1984-1988). This projection incorporates January 1, 1988 data from DOF.

To adjust housing and employment, a model was developed whereby each subregion's J/H ratio under the trend projection (computed using added jobs and housing units) was adjusted by 20 percent toward the regional 2010 ratio by reallocating approximately 9 percent of the 1984-2010 employment growth from job-rich to housing-rich subregions and 4.5 percent of housing growth from housing-rich to job-rich subregions.

The population forecast was developed by applying subregional occupancy rates and average household size to the housing forecast.

Project Alternatives

GMA-1: Baseline Projection (No Project Alternative)

This growth projection assumes that demographics and economic trends of the late 1970s and early 1980s would continue to 2010. It reflects the expected effects of current growth management policies (e.g., growth control ordinances adopted by 1987) but assumes that there would be no change in government policies or recent market trends during the planning period.

GMA-2: Jobs/Housing Balance Alternative

This projection assumes that the current imbalance of jobs and housing in the subregions would be reduced by the allocation of future jobs and housing units. Approximately 12 percent of the employment growth expected to occur in the SCAG region between 1984 and 2010 (360,000 jobs) would be redirected from job-rich or housing-poor areas with relatively high J/H ratios (e.g., the urbanized subregion, Los Angeles and Orange Counties) to job-poor or housing-rich areas with relatively low J/H ratios (e.g., the mountain/desert subregion, Riverside and San Bernardino Counties). Approximately 6 percent of projected housing growth during this period (150,000 units) would be redirected from housing-rich to housing-poor areas.

GMA-3: Local Plans Alternative

This alternative was specifically developed in response to forecasts recommended by Orange County that call for lower population and employment growth than that projected under GMA-1. Under this alternative, projected regional increases in population, housing, and employment exceeding these growth objectives were redistributed to other areas within the region on the assumption that local growth constraints would not reduce overall regional growth, which is driven by market forces.

GMA-4: Emerging Futures Alternative

This alternative is based primarily on market trends and public policy decisions since 1984. Like GMA-2, GMA-4 assumes that J/H balance objectives would be achieved within the subregions by 2010 by projecting more

employment growth in the mountain/desert area than the other alternatives, but this alternative gives greater weight to recent growth pressures, government actions, and trends, primarily telecommuting, which could alter the spatial pattern and impacts of future development.

GMA-Low

This alternative is based on DOF 2010 population projections at the county level. GMA-Low projects a regional population of 17.1 million people, 1.1 million lower than the total forecast under the proposed project. To achieve the lower regional total, all ethnic fertility rates in the SCAG demographic model were reduced. Net migration was not adjusted since both SCAG and DOF assumed similar migration levels. Employment and housing projections were determined based on labor force and household estimates derived from the DOF county population projections.

GMA-High

This alternative is based on SCAG 2010 population and employment projections that reflect 1983-1987 population growth trends and a higher national economic forecast by the U. S. Bureau of Labor Statistics. GMA-High projects a regional population of 20.2 million people, 1.9 million higher than the total forecast under the proposed project. The region's population would grow at a substantially greater rate than employment under this alternative, resulting in an increase of the regional unemployment rate to approximately 11 percent.

Comparison of Alternatives

Population

The population of the SCAG region would increase by 4.75-7.82 million (38-62 percent) from 1984 to 2010, according to these alternatives. Under each of the alternatives, the rate of population growth is expected to be highest in urbanizing subregions of the region and lowest in areas that are urbanized at present. By 2010, nearly one out of every three persons in the region is expected to live in urbanizing subregions, compared to one in five in 1984. The proportion of the population living in subregions that are now urbanized subregions is expected to decline from more than 70 percent to approximately 60 percent. Consistent with this pattern, the population of urbanizing counties such as Riverside and San Bernardino is expected to increase most rapidly, while Los Angeles County (most urbanized) would experience the lowest rate of population growth.

Housing

SCAG projects an increase of 2.51-3.44 million (54-74 percent) in the number of housing units within the region between 1984 and 2010. Under all alternatives, housing development is expected to generally follow the growth

pattern described for regional population. Approximately one out of every four housing units would be located in Riverside or San Bernardino Counties by 2010, compared to only one out of six in 1984.

Employment

Regional employment would increase by 2.82-3.37 million jobs (48-57 percent). Under all alternatives, employment would generally become more decentralized as urbanizing and mountain/desert subregions experience the highest job growth rates; Los Angeles County, where approximately two out of every three jobs in the region are now located, would see its share of regional employment fall as low as 60 percent.

Jobs/Housing Ratios

The regional J/H ratio is expected to decline from 1.27 (1984) to 1.22 (2010) under all alternatives except GMA-High, because of a greater proportional increase in housing units than in employment. The regional J/H ratio for GMA-High would be lower at 1.15 because employment growth is projected to lag behind population and housing growth under this alternative.

Overall, the proposed project and GMA-2 have similar impacts in terms of J/H balance and the environmental impacts associated with J/H, such as vehicle miles traveled, vehicle hours traveled, delay, and air quality. The greatest differences between the proposed project and GMA-2 occur in Imperial County and the mountain/desert subregion; in both areas, the proposed project would do more to improve the J/H balance than GMA-2.

The proposed project would greatly improve the J/H imbalance projected under GMA-1. As compared to GMA-1, the proposed project would lessen the imbalance in all SCAG counties, except Imperial County, and in the three subregions.

The J/H imbalance would be most adversely affected by GMA-1, which would substantially widen the existing disparity between job-rich and job-poor subareas by increasing J/H ratios in the former (e.g., Los Angeles County, Orange County, and the urbanized subregion) and decreasing these ratios in the latter (e.g., Riverside County, San Bernardino County, and the urbanizing and mountain/desert subregions).

GMA-3, GMA-4, GMA-Low, and GMA-High would result in greater imbalance within the region than the proposed project, although the resulting imbalance would still be considerably less than that which would occur under GMA-1.

SUMMARY OF PROPOSED PROJECT IMPACTS AND MITIGATION MEASURES

Table 3-1 presents a summary of the environmental impacts of the proposed project and presents one or more mitigation measures for identified significant impacts. For a number of impacts, partial mitigation is identified which would reduce impacts, but not to less-than-significant levels. Table 3-2 compares all seven growth management alternatives relative to the major quantitative impact areas. For detailed discussions of these impacts and mitigation measures, the reader can refer to the detailed discussions of each impact in the appropriate chapter. It should be noted that impacts of the proposed project have been evaluated by comparing projected (2010) conditions to existing conditions, as is the established practice under CEQA and applicable case law, rather than to the No Project Alternative (GMA-1). However, respective impacts of the proposed project and No-Project Alternative have also been compared where appropriate in chapters of the EIR.

CEQA-REQUIRED IMPACT CONCLUSIONS

Growth-Inducing Impacts

The proposed project would generate a number of growth-inducing impacts through population and employment growth, land use conversion, infrastructure expansion, and environmental effects associated with urbanization of areas adjacent or proximate to the SCAG region (e.g., San Diego and Kern Counties).

Population, Housing, and Employment Growth

Development projected under the proposed project would lead to both direct and indirect population, housing, and employment growth. As a direct result of the project, the population of the region would grow by 5.87 million persons, the housing stock of the region would grow by 2.67 million units, and regional employment would grow by 3.03 million jobs. The proposed project would also generate secondary or indirect population, housing, and employment growth in areas outside the region through household expenditures, business expenditures, and household formation resulting from increased employment.

Growth in areas outside the region would have beneficial effects, including expanded housing and employment opportunities for new or existing residents and increased public revenues. However, such growth would also have various significant effects as indicated by the analyses of development impacts presented in this report (e.g., increased traffic congestion, degraded air and water quality, and increased demand for limited water supplies).

Land and Infrastructure Development

Land use planning decisions by cities, counties, and special districts in the region, particularly those in outlying areas, that are consistent with the proposed project, including general plan amendments, rezonings, and development approvals, could promote or accelerate urbanization of areas adjacent or proximate to the region. These decisions would have direct and indirect effects on property values and land speculation and could also result in conflicts between existing and proposed land uses.

Projected development in the SCAG region would also require expansion of existing infrastructure, including freeways and streets, water and wastewater systems, landfills, schools, utility lines, and other public facilities. The timing and capacity of capital improvements, particularly those serving outlying areas of the region, could facilitate or accelerate future growth in areas outside the region by removing constraints that would otherwise limit or delay development in the latter. Development induced by capital improvements associated with the proposed project would have both beneficial and significant effects, as indicated above.

Unavoidable Adverse Impacts

Table 3-1 identifies those impacts for which no mitigation is available to reduce impacts to less than significant.

Short-Term Uses of the Environment Versus Long-Term Productivity

Implementation of the GMP would result in cumulative and long-term land use, traffic, and air quality impacts. It could also result in the exposure of an increased population to potential health and safety risks, including seismic and geologic hazards.

State CEQA Guidelines require a discussion of why the proposed project is justifiable now and should not be considered together with other options in the future. Adopting the GMP would serve as an expression of the direction for regional growth in the future. Without such a plan, it would be difficult to ensure a balancing of short-term environmental uses and long-term productivity. Plan adoption would not, however, preclude future options of revising the plan to reflect new information, changes in policy, or a general desire to pursue other alternatives.

Irreversible Environmental Changes

Implementing the proposed project would irretrievably commit open space land and those resources used for construction. Implementing the proposed project could also result in the elimination of natural habitat.

Table 3-1. Summary of Proposed Project Impacts and Mitigation Measures

Impact Category	Significant Impacts	Mitigation Measures Necessary to Reduce Significant Impacts to Less than Significant
POPULATION, EMPLOYMENT, AND HOUSING	Net increase of 5.87 million persons, 2.67 million housing units, and 3.03 million jobs.	Refer to measures in this and other chapters.
	Proportional decline of the White population and growth of the Hispanic, Black, and Asian/other populations.	Local jurisdictions and other service providers should provide accessible and effective services to members of all ethnic groups in the population, particularly to those that have special needs (e.g., immigrants and lower-income households); and Local jurisdictions and community leaders should support efforts to increase the representation of minority groups among elected and appointed positions where such representation has been substantially lower than the proportion of such groups in the general population; and Local jurisdictions should implement RHNA and other programs that would increase housing opportunities for lower-income ethnic minority households, particularly in areas of the region outside Los Angeles County.
	Growth of the 65+ age group and decline of the 0-17 age group.	Local jurisdictions and other service providers should provide accessible and effective health care and social services to members of all age groups in the population, particularly to those that have special needs (e.g., immigrants, lower-income households, and the elderly); and Public agencies and private organizations should support or provide adequate public education, job training, housing, child care, and public assistance programs for children, families, and younger adults as needed.
	Decreased household size could increase the demand for housing and per capita housing costs and the demand for social services.	Local jurisdictions and service providers should improve and expand the supply of affordable housing, as called for in the RHNA, as well as social services, particularly for single-parent families and the elderly. Measures such as the following could be considered: o identify local housing needs and develop programs to address these needs in conjunction with nonprofit and for-profit developers. Objectives of such programs could include maintaining and improving existing subsidized and below-market-rate housing, constructing new below-market-rate units, providing financial and technical housing assistance to lower-income households, promoting redevelopment projects that improve or increase the stock of affordable housing, and acquiring or reserving sites for affordable housing projects (landbanking);

Table 3-1. Continued

Impact Category	Significant Impacts	Mitigation Measures Necessary to Reduce Significant Impacts to Less than Significant
		o expand existing funding and develop new funding sources as needed to support housing programs; and o implement measures discussed in the "Health Care and Social Services" section of Chapter 6.
	Potential for decreased housing affordability.	Refer to measures identified immediately above.
	Growth in the share of employment in the services sector and decline of the share of employment in the manufacturing sector (as well as changes within the sector).	Local jurisdictions, employers, and service agencies should implement measures to upgrade skill levels and adapt to changes in the economy, such as: o job retraining of low-skilled workers for middle- and high-skilled jobs; and o job retraining of displaced workers due to structural changes in the economy; and o improving primary, secondary, and higher education programs to prepare the future labor force for future job opportunities; and o providing opportunities in small-to-medium sized businesses where most new job creation would occur.
	Continuing jobs/housing imbalance among subregions and counties.	Subregional and local jurisdictions should implement strategies to improve the regional and subregional J/H imbalance. The following measures could be considered: o in housing-poor areas, increase the amount and density of planned future residential development and/or reduce the amount of planned future commercial and industrial development through general plan revisions, zoning ordinances, and development incentives or conditions. Implementation of such measures could be a condition of consistency with regional plans and regulatory compliance; o in job-poor areas, increase the amount of planned future commercial and industrial development and/or reduce the amount of planned future residential development through general plan revisions and zoning ordinances, and development incentives or conditions. Implementation of such measures could be a condition of consistency with regional plans and regulatory compliance, as applicable;

Table 3-1. Continued

Impact Category	Significant Impacts	Mitigation Measures Necessary to Reduce Significant Impacts to Less than Significant
		o impose developer fees on commercial and industrial projects in job-rich subregions to cover external costs associated with imbalanced development, and use fee revenues to build regional transportation infrastructure, mitigate air pollution effects of imbalanced growth, increase economic development programs in job-poor subareas, and facilitate housing development in job-rich subareas; o impose developer fees on housing projects in housing-rich subregions to cover external costs associated with imbalaned development and use fee revenues as described above; o revise and enforce air quality regulations (e.g., the South Coast Air Quality Management District New Source Review Rule and the Regional Air Standards Attainment Plan) to support J/H balance by restricting economic development in job-rich areas and favoring economic development in job-poor areas; o monitor J/H balance performance as a condition of "Reasonable Further Progress" under the 1988 AQMP and restrict the flow of federal funds to those areas which fail to comply; o encourage redevelopment projects in job-poor areas; o reallocate property and sales tax revenues from job-rich to job-poor areas by developing a intra-regional tax-revenue sharing system similar to the one established in the Minneapolis-St. Paul, Minnesota region since 1975; o implement growth management programs on a regionwide level by using local police powers to provide for more balanced growth (e.g., by phasing or structuring capital improvement programs so as to shape the pattern and timing of growth and by enacting ordinances requiring that growth be restricted as necessary to maintain minimum levels of service provided by local infrastructure systems); o expand and improve infrastructure system (e.g., transportation, wastewater, schools, and recreation facilities), giving highest priority to projects that would promote job growth in job-poor areas or would promote housing growth in housing-poor areas, limiting funding for projects that would generate employment growth in job-rich areas or would generate housing growth in housing-rich areas by jointly developing and funding a regional capital improvement program or establishing intergovernmental agreements; o locate new major job-inducing public facilities (e.g., universities, airports, and government service and trade centers) in job-poor areas;

Table 3-1. Continued

Impact Category	Significant Impacts	Mitigation Measures Necessary to Reduce Significant Impacts to Less than Significant
		o encourage economic development in outlying job-poor areas by promoting the development of an extensive and active telecommunications network in the region that facilitates business location and development of those areas; o target limited state and federal economic development funds (where possible), with the highest priority being given to projects that promote job growth in job-poor areas (targeting jobs that match the skill levels of the unemployed and under-employed in those areas and assist residents of job-poor areas in relocating to areas with expanding job opportunities; o establish consistency with regional J/H balance objectives as a prerequisite or condition of incorporations approved by Local Agency Formation Commissions; and o implement measures that would further housing development objectives of the RHNA, including the increased use of redevelopment revenues for development of affordable housing.
LAND USE AND CULTURAL RESOURCES	Urbanization of approximately 650,000 acres and conversion of agricultural and open space lands	None available. The following measures would partially reduce this impact, but not to a less-than-significant level. o Refer to measures in this and other chapters. o Local jurisdictions should limit the extent of the adverse effects of urbanization of open, vacant, undisturbed, or agricultural lands by encouraging infill development at increased densities in areas that are already urbanized or are designated for urbanization rather than development of rural or outlying areas; implementing land use controls that discourage development of prime agricultural land; and encouraging the preservation and development of open space areas and parks within highly urbanized areas.
	Incorporations and annexations	Eligible voters, local jursidictions, Local Agency Formation Commissions, and applicable regional and state agencies should authorize incorporations, annexations, and special district formations or changes that would result in the maximum feasible conservation of undeveloped land, the most efficient delivery of public services, and the least fiscal imbalance among all affected jurisdictions.

Table 3-1. Continued

Impact Category	Significant Impacts	Mitigation Measures Necessary to Reduce Significant Impacts to Less than Significant
	Possible damage, destruction, or removal of recorded and unrecorded cultural resources	Local jurisdictions should require that the following measures be undertaken, prior to approving development, to protect cultural resources: o map areas of prime cultural resource significance; o consult with the appropriate archeological or historical information center and clearinghouse (i.e., University of California at Los Angeles, University of California at Riverside, San Bernardino County Museum, or Imperial Valley College Museum) to identify known cultural resources and potential cultural resources that could be found on land proposed for development; and o implement an archeological field survey if a development area is identified as "sensitive." If the field survey identifies significant cultural resources, preservation and mitigation measures should be recommended.
PUBLIC SERVICES		
Water Supply	Regional water supply shortfall of 1.2 million acre-feet (MAF) (15 percent shortfall) in 2010, of which 0.7 MAF (21 percent shortfall) would occur in the coastal plain subregion and 0.5 MAF (11 percent shortfall) in the outlying subregion	The Metropolitan Water District of Southern California and other water providers in the region should increase dependable annual supplies at a regional level by 2010 to at least 8.0 MAF and make the fullest use of existing resources by implementing the following measures as needed: o increase State Water Project (SWP) yields through implementation of a Coordinated Operation Agreement between the State and the U. S. Bureau of Reclamation; completion of various Delta facility capacity improvements, offstream storage programs, Central Valley Project and other SWP programs; and implementation of water transfer agreements between agricultural and urban SWP contractors; o obtain maximum use of Colorado River supplies; o store up to 3.0 MAF of surplus water in groundwater basins; and o make optimum use of existing resources and minimize adverse effects of supply shortfalls by local wastewater reclamation, groundwater protection, groundwater treatment, water conservation, surface water storage, and drought contingency planning projects.

Table 3-1. Continued

Impact Category	Significant Impacts	Mitigation Measures Necessary to Reduce Significant Impacts to Less than Significant
Water Quality	Degradation of surface water, groundwater, and marine water quality	Local jurisdictions should link development phasing with phasing of new infrastructure, including adequate and effective drainage, wastewater, and waste disposal facilities; and Under direction of the U. S. Environmental Protection Agency, the State Water Resources Control Board, Regional Water Quality Control Boards, and local and regional agencies should administer National Pollutant Discharge Elimination System permits for point dischargers and implement comprehensive basin plans for groundwater protection and treatment; and Applicable jurisdictions and agencies should continue their influence and expand local coastal zone planning and management programs in conjunction with the State to prevent or reduce adverse effects on coastal water quality and to preserve or improve areas of special importance such as bays and estuaries; and Local jurisdictions should implement regional air quality mitigation measures to reduce or eliminate the potential adverse water quality effects of lead fallout and acid precipitation; and Local jurisdictions and water providers should mitigate groundwater quality problems by improving groundwater basin management as recommended in Regional Water Quality Control Board groundwater basin plans using various methods, including: conjunctive use of surface water, groundwater, and reusable wastewater; appropriate use of artificial recharge; and controls on development in recharge areas; and Local jurisdictions should mitigate adverse effects of water pollution from nonpoint and other sources by implementing measures in SCAG's Areawide Waste Treatment Management Plan, including: implementing plans for containing and cleaning hazardous substance spills; strengthening and enforcing local management controls on construction site erosion and sediment control; implementing best management practices to control water pollution from agricultural areas; implementing improved streets, litter, catchbasin, inlet basins, and storm drain cleaning programs; and implementing measures to limit runoff and minimize peak flows from developing areas.

Table 3-1. Continued

Impact Category	Significant Impacts	Mitigation Measures Necessary to Reduce Significant Impacts to Less than Significant
Wastewater Treatment	Increased daily wastewater treatment demand to 2,171 million gallons, exceeding available treatment capacity as follows: San Bernardino County - 51 percent Riverside County - 45 percent Los Angeles County - 19 percent Imperial County - 15 percent Orange County - 5 percent	The 1974 Areawide Waste Treatment Management Plan (208) should be updated to be consistent with the GMP and AQMP; and To accommodate peak flows and to provide for a capacity reserve of approximately 10 percent, wastewater collection and treatment facilities should upgrade their facilities to the following 2010 capacity levels (percent over existing and funded capacity): o Ventura County - 130 million gallons per day (MGD) (34) o Los Angeles County - 1,850 MGD (65) o Orange County - 510 MGD (47) o Riverside County - 210 MGD (106) o San Bernardino County - 300 MGD (108) o Imperial County - 23 MGD (64)
Solid Waste	Depletion of existing landfill capacity by the following years: Ventura County - 1989 San Bernardino County - 1990 Orange County - 1995 Los Angeles County - 1996 Imperial County - 2008 Riverside County - 2008	A comprehensive size regional solid waste management plan should be developed; and The following counties, in their respective solid waste management plans, should require the following improvements, as identified by the California Waste Management Board: o Ventura County - complete the major expansion of an existing landfill and develop a new landfill; o Los Angeles County - expand existing landfills, develop new landfills, and implement resource recovery projects; o Orange County - expand two existing landfills and develop a new landfill; o Riverside County - expand one landfill and develop two new landfills; o San Bernardino County - develop plans to expand one landfill; and o Imperial County - develop plans to expand landfills.

Table 3-1. Continued

Impact Category	Significant Impacts	Mitigation Measures Necessary to Reduce Significant Impacts to Less than Significant
Hazardous Waste	Generation of 1.14-1.48 million tons of offsite hazardous waste in 2010	The Southern California Hazardous Waste Management Authority should adopt and implement the 1989 Regional Hazardous Waste Management Plan; and Hazardous waste management entities should increase the annual regional hazardous waste management capacity to 1.5 million tons by 2010 by establishing new disposal and treatment facilities.
Schools	Demand for 677 additional schools and 31,000 additional teachers	Local school districts should implement the following measures as needed: o increase transportation of students from overcrowded schools to schools with surplus space; o increase the capacity of all existing facilities through extended (e.g., year-round) schedules or other means; o build at least 677 new schools by 2010, including 582 elementary and junior high schools and 95 senior high schools; o assess maximum allowable school impact fees as authorized by AB 2926 and use fee revenues to provide interim and permanent facilities; o if fee revenues and state funding are not sufficient to acquire school sites and provide new facilities, establish alternative financing mechanisms, such as community facility districts, to generate needed revenues or negotiate agreements that provide for site dedication and/or school construction by private parties; o hire additional qualified administrative, teaching, and support staff, including at least 31,000 new teachers; and o provide educational programs that meet the educational needs of all students, particularly those whose English speaking ability is limited or who are otherwise disadvantaged.

Table 3-1. Continued

Impact Category	Significant Impacts	Mitigation Measures Necessary to Reduce Significant Impacts to Less than Significant
Law Enforcement	Need for at least 11,430 additional police officers and sheriffs and additional facilities (above 1984 levels)	Law enforcement entities should provide needed police personnel, facilities, and equipment, as required by new development, by implementing the following measures, as needed: o implement programs to reduce the crime rate, including drug and gang prevention programs and education, job training, and community activities for youth and young adults; o place greater reliance on developers to provide needed services and facilities; o achieve better efficiency in the delivery of police protection services and use of facilities through consolidation of services, better use of underutilized facilities, and redefinition of service district boundaries to achieve better efficiencies of scale; o use new technologies and policies that increase system efficiencies and reduce demands; o require that services be contracted to the private sector, such as private surveillance, in those instances where they can be provided more efficiently and at less cost; o promote greater responsibility for nongovernmental provision of certain services or facilities at the neighborhood or homeowner association level; and o require that development be phased according to the availability of adequate public services and facilities.
Fire Protection	Need for at least 7,100 - 10,970 additional fire protection personnel and additional facilities (above 1977 staffing level)	Fire protection entities should provide needed fire personnel, facilities, and equipment, as required by new development, by implementing the following measures, as needed: o reduce fire protection demands and costs by requiring adequate emergency access, applying land use restrictions in high-risk areas and performance standards on high-risk activities, and incorporating standard fire prevention features into new development (such as automatic sprinklers); o implement fire safety education programs; o provide specialized training for fire personnel as needed;

Table 3-1. Continued

Impact Category	Significant Impacts	Mitigation Measures Necessary to Reduce Significant Impacts to Less than Significant
		o achieve better efficiency in the delivery of fire protection services and use of facilities through consolidation of services, better use of underutilized facilities, and redefinition of service district boundaries to achieve better efficiencies of scale; o use new technologies and policies that increase system efficiencies and reduce demands; o promote greater responsibility for nongovernmental provision of certain services or facilities at the neighborhood or homeowner association level; and o require that development be phased according to the availability of adequate public services and facilities.
Health Care and Social Services	Increased need for health care services and facilities	Public and private health service providers should expand staff and facilities as needed. Facilities operating by 2010 should include at least 500 new skilled nursing facilities and additional hospitals, intermediate care facilities, and clinics. Providers should improve salaries and working conditions to attract and retain a sufficient number of skilled nurses and other medical personnel; and Public agencies and private organizations should expand subsidized health care services and provide more comprehensive health insurance coverage to those who cannot afford the costs of services, particularly to families with young children, the elderly, and those with acute health care needs; and Health service providers should develop and expand innovative, affordable, and cost-effective alternatives such as preventative care, adult day care, and home health care services.
	Increased need for public assistance	Local, state and federal government agencies should increase the efficienty of the Food Stamps and MediCal programs to better serve those in need; and Public agencies and private organizations should reduce the level of future demand for public assistance by jointly developing and implementing innovative and cost-effective education, job training, job placement, child care, and family support programs.

Table 3-1. Continued

Impact Category	Significant Impacts	Mitigation Measures Necessary to Reduce Significant Impacts to Less than Significant
	Increased need for other social services	Employers in the region should participate directly or indirectly in providing or supporting child care services; and Service providers should develop and expand innovative, affordable, and cost-effective programs for delivering social services to the elderly, children, and the general population.
Energy	Increased electricity and natural gas demand of 41,500 Gigawatt-hours (Gwh) and 260 billion cubic feet (bcf) per year, respectively	Utilities, local jurisdictions, and residents should participate in implementation of the following measures: o reduce overall future electricity demand in the region by 20 percent or 22,600 Gwh/yr through energy conservation; o reduce overall future natural gas demand in the region by 15 percent or 111.62 bcf/yr through energy conservation; o reduce total annual residential sector demand by 25 percent, or 8,500 Gwh and 73.22 bcf/yr, by applying California Title 24 building standards and state and federal appliance efficiency standards to all new construction, requiring retrofitting of existing buildings (e.g., weatherstripping and insulation) as feasible, shifting consumption to off-peak hours by developing, and implementing residential load management standards and rate adjustments; o reduce total annual commercial sector demand by 30 percent, or 10,000 Gwh and 23.14 bcf per year, by implementing Title 24 nonresidential building standards to all new construction, installing cost-effective conservation measures in existing commercial buildings, and developing and implementing lighting and commercial appliance efficiency standards; o reduce total annual industrial sector demand by 5 percent or 2,600 Gwh and 15.22 bcf per year by implementing increased motor and operation and control efficiency standards, installing cost-effective energy conservation equipment on industrial facilities (e.g., boilers), and increasing agricultural pumping efficiency; o provide incentives for cleaner and less energy-intensive industrial development and promote cogeneration and other practices to reduce manufacturing and industrial energy consumption; o increase the use of renewable and alternative energy sources (e.g., wind and geothermal) that generally are less capital-intensive and have shorter development lead times than conventional sources; and

Table 3-1. Continued

Impact Category	Significant Impacts	Mitigation Measures Necessary to Reduce Significant Impacts to Less than Significant
		o apply measures recommended in the AQMP that would reduce overall in the generation of fossil fuel-based electricity within the air basin.
	Increased annual motor fuel demand of 250-768 million gallons per year	Transportation agencies, local jurisdictions, employers, residents, and the automobile industry should participate in the implementation of the following measures: o increase average vehicle fuel economy, particularly that of light-duty passenger vehicles, through technological change; o increase the use of vehicles with greater fuel economy through increased fuel costs, taxes, or other economic incentives; o increase the use of alternative or renewable energy sources (e.g., alcohol or other liquid fuels from biomass, hydrogen produced from solar or wind power, or the direct use of electricity generated by solar or wind power); o plan future growth so as to minimize transportation energy use by promoting mixed-use development, public transit, nonmotorized travel, and beneficial social or technological developments (e.g., telecommunications); and o reduce projected levels of future traffic congestion by implementing the preferred RMP strategy, as described in Chapter 7.
TRANSPORTATION	42 percent increase in total regional person-trips. Little change in the proportion of intracounty home-work trips to total home-work trips regionally or within counties 64 percent increase in home-work trips from Riverside and San Bernardino Counties to Los Angeles County; 80 percent increase from Riverside and San Bernardino Counties to Orange County; 137 percent increase between Riverside and San Bernardino Counties	None available to reduce the level of congestion and amount of delay to that experienced in 1984. The following mitigation measure would partially reduce these impacts, but not to a less-than-significant level: o Implement the Regional Mobility Plan preferred strategy which calls for: - facility development with 875 lane-miles of new roadway construction, 983 lane-miles of new high occupancy vehicle (HOV) capacity, 397 miles of new rapid transit systems, and 112 new park-and-ride lots; - implementation of jobs-housing balance policies to shift 9 percent of new jobs to job-poor areas and 4.5 percent of new housing to housing-poor areas;

Table 3-1. Continued

Impact Category	Significant Impacts	Mitigation Measures Necessary to Reduce Significant Impacts to Less than Significant
	6 percent increase in average trip time and an 8 percent increase in average trip length	- demand management through the South Coast Air Quality Management District's Regulation XV, modified work weeks, employment center carpool goals, increased transit work trips, and extended peak periods; and
	29 percent of the hours of travel would be spent traveling at less-than-free-flow speeds, compared to 10 percent in 1984	- system management of the existing and proposed roadway system through programs such as "SMART Freeway" technology; CALLBOX service authorities; and expansion of model separation programs, ramp metering, HOV ramp-meter-bypass installations, synchronized signals, and pavement management programs.
	57 percent increase in regional vehicles miles traveled (VMT) with a 231 percent increase in VMT in Riverside and San Bernardino Counties	
	48 percent increase in miles of congestion during the a.m. and p.m. peak hours with 79 percent of the congestion in Los Angeles and Orange Counties	
	Decrease in the transit mode split from 6.6 percent to 5.1 percent	

Table 3-1. Continued

Impact Category	Significant Impacts	Mitigation Measures Necessary to Reduce Significant Impacts to Less than Significant
AIR QUALITY	Exceedance of target emissions levels (amount of emissions that could be produced in the South Coast Air Basin [SCAB] without violating federal and state air quality standards) as identified by the South Coast Air Management District (1988d). Target levels would be exceeded by the following amounts: o reactive organic gases (ROG): 400-500 percent, o carbon monoxide (CO): 20-25 percent, o nitrogen oxide; (NOx): 250-350 percent, o sulfur oxides (SOx): 100-300 percent, and o inhalable particulate matter: 60-80 percent.	None available for all pollutants. The following measures would partially reduce this impact, but not to less than significant for all pollutants: o Implement the transportation measures (Strategy 3) discussed in Chapter 7; and o Implement stationery, area, and mobile source control measures. Implementation of these measures may reduce CO, SOx, and inhalable particulate matter emissions at or below target levels.
	Exceedance of the 1982 Air Quality Management Plan (AQMP) 2000 emissions estimates, which assume implementation of recommended control measures, by the following amounts: o ROG: 75 percent, o CO: 150-175 percent, o NOx: 75-100 percent, o SOx: up to 100 percent, and o inhalable particulate matter: 50-75 percent.	None available for all pollutants. The following measures would partially reduce this impact, but not to less than significant for all pollutants: o Implement the transportation measures (Strategy 3) discussed in Chapter 7, and o Implement stationery, area, and mobile source control measures. Implementation of these measures may reduce ROG, NOx, and SOx emissions at or below the 1982 AQMP levels.

Table 3-1. Continued

Impact Category	Significant Impacts	Mitigation Measures Necessary to Reduce Significant Impacts to Less than Significant
NOISE	Exceedence of normally acceptable noise levels.	None available at some locations. The following mitigation measure would reduce this impact to a less-than-significant level at some locations: o Local and state jurisdictions should require needed noise abatement measures (such as construction of noise barriers and reduction of interior noise levels through building and site design features) to attain noise levels compatible with affected land uses; such measures should be designed based on an acoustical analysis by a qualified acoustical engineer.
ECOLOGICAL RESOURCES	Habitat loss from encroaching development	Local jurisdictions in the SCAG region, in their respective general plans, should adopt policies with the following objectives: o conduct detailed inventories of biological resources that need protection to preserve natural diversity at the local and regional level; o preserve unique natural areas; o preserve prime agricultural lands, especially where such lands are connected to lands permanently set aside as conservation or open space lands; o avoid significant habitats as a prerequisite for future development plans; o improve the identification and implementation of mitigation measures for potentially impacted biological resources at the local level; and o develop funding mechanisms to purchase and dedicate important biological resource lands as reserves and preserves. SCAG should develop a comprehensive regional plan to protect biological resources.
	Fragmentation of remaining habitats	Local jurisdictions in the SCAG region, in their respective general plans, should adopt policies with the following objectives: o establish buffers where wildlands meet new development to form a transition area and provide some space between development and wildlands that need protection; o establish corridors between remnant habitat areas or between remnants and large wildland parcels in general and specific plans and in local, subregional, and regional conservation and open space planning; and

Table 3-1. Continued

Impact Category	Significant Impacts	Mitigation Measures Necessary to Reduce Significant Impacts to Less than Significant
		o identify particular areas where fragmentation may be a problem and develop measures to provide or maintain corridors, translocate individual animals if numbers become too low, and provide buffers.
	Loss of riverine, riparian, and wetland habitats	Local jurisdictions in the SCAG region, in their respective general plans, should adopt policies with the following objectives:
		o use open space and conservation designation to protect riverine, riparian, and freshwater wetlands from development;
		o promote naturalized flood control channels such as those promoted under the California Department of Water Resources Urban Creeks Program;
		o support the design of flood control channels to accommodate flood flows in vegetated channels;
		o require all projects that impact riverine, riparian, and wetlands resources to mitigate in-kind for any habitat impacts;
		o support local, subregional, and regional mitigation banks that create or restore degraded riparian or wetland habitats; and
		o facilitate coordination with U. S. Army Corps of Engineers on Section 10/404 permits (dredged/discharge fill material) and with the California Department of Fish and Game on Fish and Game Code Section 1601-3 agreements (channel modifications) to afford maximum habitat protection and coordinated creation and restoration planning.
	Loss of individuals and habitat for rare, threatened, and endangered species	Local jurisdictions in the SCAG region, in their respective general plans, should adopt policies with the following objectives:
		o require surveys as part of the planning process for all species that are candidate, proposed, or listed under the federal and state Endangered Species Acts;
		o require adequate mitigation for any development that would have an adverse impact on listed species;
		o encourage mitigation activities to be monitored and ensure that provisions be made in entitlements for successful implementation;
		o encourage enhancement of listed species habitats through conservation and open space plans to protect species whose numbers are becoming so low they soon will be listed;

Table 3-1. Continued

Impact Category	Significant Impacts	Mitigation Measures Necessary to Reduce Significant Impacts to Less than Significant
		o recognize the development of Habitat Conservation Plans (HCP) (Section 10 of the federal Endangered Species Act) or their equivalent as special land use plans that incorporate large areas and many ownerships in a cooperative plan to support a listed species; and
		o encourage the development of public and private mitigation banks that incorporate large areas where habitats can be created or enhanced to compensate for habitat lost to development.
	Loss of habitats from wildlands fire and fire suppression	Local jurisdictions in the SCAG region should support fire hazard mitigation planning that seeks to keep fuel loads suppressed without removing all the vegetation.
	Recreational impacts in desert, mountains, and coastal areas	Local jurisdictions in the SCAG region should adopt policies with the following objectives:
		o coordinate local park planning with the appropriate state departments and federal agencies;
		o support adequate funding for law enforcement personnel to protect reserve, preserves, parks, and other public lands;
		o support a wide range of facilities from intensive activity park sites to wilderness areas; and
		o use habitat and species surveys discussed earlier under mitigation for potential habitat and listed species losses to identify areas to be avoided for recreational activities and facilities.
	Reduced tree vigor and increased tree mortality from air pollution	Local jurisdiction in the SCAG region should adopt policies with the following objectives:
		o support continued research to find improved strains of coniferous species that are more tolerant of pollutants; and
		o implement the air pollution mitigation measures identified by the 1988 AQMP.
	Effects of pollutants on near shore ocean waters	Refer to the water quality measures for coastal areas identified in Chapter 6.

Table 3-1. Continued

Impact Category	Significant Impacts	Mitigation Measures Necessary to Reduce Significant Impacts to Less than Significant
GEOLOGY AND HYDROLOGY		
Seismicity	Increased exposure to seismic hazards	None available. The following measures would partially reduce this impact, but not to less than significant: o Local jurisdictions within the SCAG region should continue to: - implement the Alquist-Priolo Act by identifying areas of severe seismic hazard and avoid them as development areas; - develop disaster relief programs to serve the entire SCAG region and improve interjurisdictional coordination; - institute programs to identify those structures throughout the SCAG region that are especially vulnerable to earthquakes and endeavor to repair or replace dangerously vulnerable building; and - comply strictly with ordinances and regulations governing construction of homes, buildings, and facilities in seismically active areas.
Aggregate Resources	Depletion of Portland Cement Concrete (PCC) Aggregate Sources would increase construction costs	Local jurisdictions in the SCAG region should continue to comply with the Surface Mining and Reclamation Act, which requires them to incorporate mineral resource management policies into their general plans, such as the implementation of land use planning strategies that avoid future development on lands containing significant PCC grade aggregate resources and that site compatible uses adjacent to aggregate resource sites and along mine access routes.
Hydrology	Potential aggravation of landslide and erosion conditions in hilly and mountainous areas	Local jurisdictions in the SCAG region, in their respective general plans, should continue to require the following: o inspection of slopes above and below proposed developments by a geotechnical engineer prior to grading and following fine grading of construction sites and adherence to recommendations for the elimination of hazardous soil and slope conditions; o implementation of fire prevention measures; o revegetation following fire damage to reduce the amount of rock, soil, and other debris that would flow downslope during rainfall events by allowing vegetation to anchor soils and detain runoff; and

Table 3-1. Continued

Impact Category	Significant Impacts	Mitigation Measures Necessary to Reduce Significant Impacts to Less than Significant
		o installation and maintenance of sedimentation basins in appropriate locations along drainages to capture sediment, mudflows, and landslides before they reach homes and other flood damage- able property.
	Potential exposure of new development in desert areas to flash floods	Local jurisdictions in the SCAG region, in their respective general plans, should continue to: o identify flash flood wash areas and other geologic formations indicating past flooding activity, as determined by a hydrologist or hydraulic engineer experienced with flash flood conditions; o require avoidance of future development in flash flood susceptible areas; o require that information concerning flood hazard potential be posted at all access points to parks and recreation areas, in the event of rainfall; and o require installation of adequate flood control structures to protect existing and future development from flash flood hazards and design of flood control structures by a registered professional engineer experienced in the design of flood control and flood protection structures for flash flood runoff events.

Table 3-2. Comparison of Major Quantifiable Impacts Associated with the Proposed Project and Alternatives

Impact Category	Impact: CMA-4 Modified (Proposed Project)	CMA-1 (No Project)	CMA-2	CMA-3	CMA-4	CMA-Low	CMA-High
POPULATION, HOUSING AND EMPLOYMENT	Positive and adverse effects on the existing jobs/housing imbalance among subregions and counties, as follows:[a]	Positive and adverse effects on the existing jobs/housing imbalance among subregions and counties, as follows:[a]	Positive and adverse effects on the existing jobs/housing imbalance among subregions and counties, as follows:[a]	Positive and adverse effects on improve the existing jobs/housing imbalance among subregions and counties, as follows:[a]	Positive and adverse effects on the existing jobs/housing imbalance among subregions and counties, as follows:[a]	Positive and adverse effects on the existing jobs/housing imbalance among subregions and counties, as follows:[a]	Positive and adverse effects on the existing jobs/housing imbalance among subregions and counties, as follows:[a]
	Subregions	Subregions	Subregions	Subregions	Subregions	Subregions	Subregions
	Urbanized: -56	Urbanized: -139	Urbanized: -54	Urbanized: -94	Urbanized: -67	Urbanized: -56	Urbanized: -84
	Urbanizing: 18	Urbanizing: -48	Urbanizing: 21	Urbanizing: -9	Urbanizing: -23	Urbanizing: 16	Urbanizing: 10
	Mountain/desert: 11	Mountain/desert: -13	Mountain/desert: -1	Mountain/desert: -2	Mountain/desert: 33	Mountain/desert: 10	Mountain/desert: 9
	Counties	Counties	Counties	Counties	Counties	Counties	Counties
	Ventura: 34	Ventura: -16	Ventura: 28	Ventura: 35	Ventura: 38	Ventura: 29	Ventura: 46
	Los Angeles: -25	Los Angeles: -87	Los Angeles: -19	Los Angeles: -77	Los Angeles: -46	Los Angeles: -28	Los Angeles: -46
	Orange: -85	Orange: -226	Orange: -85	Orange: -91	Orange: -89	Orange: -63	Orange: -77
	Riverside: 9	Riverside: -43	Riverside: 4	Riverside: -24	Riverside: -14	Riverside: 8	Riverside: 7
	San Bernardino: 9	San Bernardino: -25	San Bernardino: 15	San Bernardino: 11	San Bernardino: 9	San Bernardino: 9	San Bernardino: 7
	Imperial: 74	Imperial: 5	Imperial: 5	Imperial: -10	Imperial: 70	Imperial: 103	Imperial: 149
PUBLIC SERVICES							
Wastewater Treatment	Increased daily wastewater demand to 2,171 million gallons, exceeding available treatment capacity as follows:	Increased daily wastewater demand to 2,161 million gallons, exceeding available treatment capacity as follows:	Increased daily wastewater demand to 2,173 million gallons, exceeding available treatment capacity as follows:	Increased daily wastewater demand to 2,157 million gallons, exceeding available treatment capacity as follows:	Increased daily wastewater demand to 2,168 million gallons, exceeding available treatment capacity as follows:	Increased daily wastewater demand to 2,046 million gallons, exceeding available treatment capacity as follows:	Increased daily wastewater demand to 2,387 million gallons, exceeding available treatment capacity as follows:
	San Bernardino: 51%	San Bernardino: 53%	San Bernardino: 45%	San Bernardino: 58%	San Bernardino: 48%	San Bernardino: 32%	San Bernardino: 80%
	Riverside: 45%	Riverside: 58%	Riverside: 43%	Riverside: 64%	Riverside: 49%	Riverside: 27%	Riverside: 75%
	Los Angeles: 19%	Los Angeles: 15%	Los Angeles: 18%	Los Angeles: 16%	Los Angeles: 18%	Los Angeles: 12%	Los Angeles: 27%
	Imperial: 15%	Imperial: 31%	Imperial: 31%	Imperial: 34%	Imperial: 45%	Imperial: 35%	Imperial: 20%
	Orange: 5%	Orange: 7%	Orange: 11%		Orange: 5%	Orange: 3%	Orange: 14%
							Ventura: 9%
Solid Waste	Depletion of existing landfill by the following years:	Depletion of existing landfill by the following years:	Depletion of existing landfill by the following years:	Depletion of existing landfill by the following years:	Depletion of existing landfill by the following years:	Depletion of existing landfill by the following years:	Depletion of existing landfill by the following years:
	Ventura: 1989	Ventura: 1989	Ventura: 1989	Ventura: 1989	Ventura: 1989	Ventura: 1989	Ventura: 1989
	San Bernardino: 1990	San Bernardino: 1990	San Bernardino: 1990	San Bernardino: 1990	San Bernardino: 1990	San Bernardino: 1990	San Bernardino: 1990
	Orange: 1995	Orange: 1995	Orange: 1995	Orange: 1996	Orange: 1995	Orange: 1995	Orange: 1995
	Los Angeles: 1996	Los Angeles: 1996	Los Angeles: 1996	Los Angeles: 1996	Los Angeles: 1996	Los Angeles: 1997	Los Angeles: 1996
	Imperial: 2008	Imperial: 2008	Imperial: 2005	Imperial: 2005	Imperial: 2004	Imperial: 2005	Imperial: 2006
	Riverside: 2008	Riverside: 2009	Riverside: 2009	Riverside: 2007	Riverside: 2009	Riverside: 2007	Riverside: 2007

NOTE: N/A = Not available.

[a] Positive values of 100 or less indicate percentage of movement toward the projected 2010 regional jobs/housing ratio relative to 1984; negative values and positive values of greater than 100 indicate movement away from the regional ratio.

Table 3-2. Continued

Impact Category	Impact						
	GMA-4 Modified (Proposed Project)	GMA-1 (No Project)	GMA-2	GMA-3	GMA-4	GMA-Low	GMA-High
TRANSPORTATION	64 percent increase in home-work trips from Riverside and San Bernardino Counties to Los Angeles County; 80 percent increase from Riverside and San Bernardino Counties to Orange County; 137 percent increase between Riverside and San Bernardino Counties.	164 percent increase in home-work trips from Riverside and San Bernardino Counties to Los Angeles County; 290 percent increase from Riverside and San Bernardino Counties to Orange County; 121 percent increase between Riverside and San Bernardino Counties.	48 percent increase in home-work trips from Riverside and San Bernardino Counties to Los Angeles County; 64 percent increase from Riverside and San Bernardino Counties to Orange County; 121 percent increase between Riverside and San Bernardino Counties.	101 percent increase in home-work trips from Riverside and San Bernardino Counties to Los Angeles County; 130 percent increase from Riverside and San Bernardino Counties to Orange County; 162 percent increase between Riverside and San Bernardino Counties.	115 percent increase in home-work trips from Riverside and San Bernardino Counties to Los Angeles County; 146 percent increase from Riverside and San Bernardino Counties to Orange County; 117 percent increase between Riverside and San Bernardino Counties.	62 percent increase in home-work trips from Riverside and San Bernardino Counties to Los Angeles County; 72 percent increase from Riverside and San Bernardino Counties to Orange County; 130 percent increase between Riverside and San Bernardino Counties.	100 percent increase in home-work trips from Riverside and San Bernardino Counties to Los Angeles County; 108 percent increase from Riverside and San Bernardino Counties to Orange County; 182 percent increase between Riverside and San Bernardino Counties.
	6 percent increase in average trip time and an 8 percent increase in average trip length.	12 percent increase in average trip time and a 17 percent increase in average trip length.	5 percent increase in average trip time and a 7 percent increase in average trip length.	9 percent increase in average trip time and a 12 percent increase in average trip length.	7 percent increase in average trip time and a 9 percent increase in average trip length.	7 percent increase in average trip time and a 9 percent increase in average trip length.	7 percent increase in average trip time and a 9 percent increase in average trip length.
	29 percent of the hours of travel would be spent traveling at less-than-free-flow speeds, compared to 10 percent in 1984.	52 percent of the hours of travel would be spent traveling at less-than-free-flow speeds, compared to 10 percent in 1984.	N/A	N/A	N/A	29 percent of the hours of travel would be spent traveling at less-than-free-flow speeds, compared to 10 percent in 1984.	41 percent of the hours of travel would be spent traveling at less-than-free-flow speeds, compared to 10 percent in 1984.
	26 percent decrease in freeway speeds and a 20 percent decrease in speeds on all facilities.	49 percent decrease in freeway speeds and a 46 percent decrease in speeds on all facilities.	N/A	N/A	N/A	26 percent decrease in freeway speeds and a 20 percent decrease in speeds on all facilities.	36 percent decrease in freeway speeds and a 34 percent decrease in speeds on all facilities.
	57 percent increase in regional VMT with a 131 percent increase in VMT in Riverside and San Bernardino Counties.	70 percent increase in regional VMT with a 161 percent increase in VMT in Riverside and San Bernardino Counties.	N/A	N/A	N/A	55 percent increase in regional VMT with a 127 percent increase in VMT in Riverside and San Bernardino Counties.	75 percent increase in regional VMT with a 168 percent increase in VMT in Riverside and San Bernardino Counties.
	748 percent increase in regional miles of congestion during the a.m. and p.m. peak hours with 79 percent of the congestion in Los Angeles and Orange Counties.	1,471 percent increase in regional miles of congestion during the a.m. and p.m. peak hours with 74 percent of the congestion in Los Angeles and Orange Counties.	N/A	N/A	N/A	712 percent increase in regional miles of congestion during the a.m. and p.m. peak hours with 80 percent of the congestion in Los Angeles and Orange Counties.	1,275 percent increase in regional miles of congestion during the a.m. and p.m. peak hours with 76 percent of the congestion in Los Angeles and Orange Counties.

Note: N/A = Not available.

Table 3-2. Continued

	Impact						
Impact Category	CMA-4 Modified (Proposed Project)	CMA-1 (No Project)	CMA-2	CMA-3	CMA-4	CMA-Low	CMA-High
AIR QUALITY	Exceedance of target emission levels by the following amounts: o ROG: 400-500 percent, o CO: 20-25 percent, o NOx: 250-350 percent, o SOx: 100-300 percent, and o inhalable particulate matter: 60-80 percent.	Exceedance of target emission levels by the following amounts: o ROG: 500 percent, o CO: approximately 75 percent, o NOx: 400 percent, o SOx: approximately 200 percent, and o inhalable particulate matter: approximately 80 percent.	N/A	N/A	N/A	N/A	N/A
	Exceedance of the 1982 Air Quality Management Plan (AQMP) 2000 emissions estimates by the following amounts: o ROG: 75 percent, o CO: 150-175 percent, o NOx: 75-100 percent, o SOx: up to 100 percent, and o inhalable particulate matter: 50-75 percent.	Exceedance of the 1982 Air Quality Management Plan (AQMP) 2000 emissions estimates by the following amounts: o ROG: 90 percent, o CO: 250-300 percent, o NOx: 100-150 percent, o SOx: 50 percent, and o inhalable particulate matter: approximately 70 percent.	N/A	N/A	N/A	N/A	N/A

Note: N/A = Not available.

CHAPTER 4. POPULATION, HOUSING, AND EMPLOYMENT

SETTING

Population

Regional Trends

The region's population has grown more rapidly during the 1980s than during the 1970s. The population increased from 9.98 million in 1970 to 11.59 million in 1980, growing at an average annual rate of 1.5 percent. From 1980 to 1984, the regional population increased by approximately 800,000 (1.8 percent per year), growing from 11.54 million to 12.38 million (Southern California Association of Governments 1982, Southern California Association of Governments 1988h). The 1987 regional population was estimated to be 13.38 million, indicating that population grew by 1.0 million (2.6 percent per year) from 1984 to 1987 (California Department of Finance 1987).

Subregional Distribution. 1970-1980 population growth rates for counties in the SCAG region ranged from 31.4 to 44.5 percent, with the exception of Los Angeles County, which grew by only 6 percent. Nearly three-fourths (72.8 percent) of the region's population in 1984 lived in urbanized subregions, with 22.0 percent living in urbanizing subregions and 5.2 percent living in mountain/desert subregions. Among the six counties in the region, nearly two-thirds (63.5 percent) lived in Los Angeles County, and one-sixth (16.7 percent) lived in Orange County in 1984. Of the remainder, 8.2 percent lived in San Bernardino County, 6.1 percent lived in Riverside County, 4.7 percent lived in Ventura County, and 0.8 percent lived in Imperial County. Subregional areas are described in Chapter 2. Subregional and county population figures for 1984 are shown in Table 2-1.

Ethnicity. In 1980, a majority (60.6 percent) of the region's population was classified as Whites, with the remainder consisting of Hispanics (24.2 percent), Blacks (9.0 percent), and Asians/Others (5.4 percent). The NH White population is the most widely dispersed of these ethnic groups among the region's six counties.

From 1970 to 1980, the regionwide White population declined by 6.1 percent, decreasing most rapidly (20.6 percent) in Los Angeles County while growing moderately (18.6-33.6 percent) in other counties. The regional Asian/Other population increased by 152.2 percent during this period, growing at the greatest rate in Orange, San Bernardino, and Riverside Counties. The regional Hispanic population doubled in the 1970s, growing substantially in every county, primarily Orange County. The Black population increased

by 28.2 percent, with greatest growth occurring in Orange County. (Southern California Association of Governments 1988h)

In 1980, approximately three-fourths of the regionwide Asian/Other and Hispanic population (74.1 and 73.6 percent, respectively) resided in Los Angeles County. A large majority (89 percent) of the region's Black population in 1980 resided in Los Angeles County. Sizeable Black communities are also located in Orange, San Bernardino, and Ventura Counties.

Ethnic minorities in the region are generally underrepresented in the political process. The lack of minority representation is attributed to the lack of sufficient economic resources necessary for effective participation in the nomination and election process, the low number of minority appointees to public positions, and low voter registration and turnout rates in minority communities (particularly among newer immigrants). District boundaries are also a contributing factor in limiting political representation of minorities. For example, 28 percent of the population of the City of Los Angeles is Hispanic, yet the Hispanic population was so divided among various districts in 1982 that only one of 15 districts had a Hispanic majority. In response to a lawsuit brought by the U. S. Justice Department, the city has recently prepared a redistricting plan for a second largely Hispanic district. A similar lawsuit has also been filed against Los Angeles County. The Board of Supervisors is seeking to defer redistricting decisions to the 1980 Census.

More than 90 percent of the White population in 1980 lived in neighborhoods where Whites comprised an ethnic majority. Comparable figures for Blacks, Hispanics, and Asians/Others were 61, 45, and 3 percent, respectively. Asian/Other and Hispanic neighborhoods include many immigrants. More than 80 percent of foreign immigrants have settled in Los Angeles County. In contrast, approximately half of all those immigrating to the region (moving from other areas within the United States) has settled in Los Angeles County, and another 20 percent has settled in Orange County. (Southern California Association of Governments 1988h)

Age Distribution. The changing age structure of the region's population presents various challenges to service providers. According to estimates compiled by the DOF (Table 4-1), the total population of the six counties that comprise the SCAG region increased by 10.2 percent from 1980 to 1985. The 65-and-above age group became a larger proportion of the population (increasing from 9.9 to 10.5 percent) during this period based on an above-average growth rate of 16.7 percent. The 0-17 age group grew by 9.6 percent, and the 18-64 age group grew by 9.5 percent. (California Department of Finance 1986)

Recent population aging trends have been most pronounced in coastal and urbanized areas of the region (i.e., Los Angeles, Ventura, and Orange Counties). The median age of persons living in these three counties increased by 1.4-1.7 years between 1980 and 1985. The population of inland areas (Riverside, San Bernardino, and Imperial Counties) also aged during this period, but to a lesser extent (0.4-0.9 years).

With the exception of Los Angeles County, the proportion of the population in the 0-17 age group declined and the proportion in the 18-64 age group increased. With the exception of Riverside and San Bernardino

Table 4-1. Existing and Projected Regional Population Age Distribution, 1980-2010, Under Proposed Project and Alternatives

	1980		2010		Increase, 1984-2010	
Age Group	Number	Percentage of Total	Number	Percentage of Total	Number	Percentage
0-17	3,221,900	27.7	4,369,800	23.9	1,147,900	35.6
18-64	7,266,700	62.4	11,553,500	63.3	4,286,800	58.9
65 and over	1,148,600	9.9	2,332,900	12.8	1,184,300	103.1
Total	11,637,200	100.0	18,256,200	100.0	6,619,000	56.9

Sources: California Department of Finance 1986
Southern California Association of Governments 1987

Counties, the percentage of persons aged 65 and over also increased. Imperial County had the highest 1980-1985 0-17 age group growth rate and the youngest population in 1985. Riverside County had the highest 1980-1985 65-and-over age group growth rate and the oldest population in 1985. Orange County had the lowest 0-17 age group growth rate and highest 18-64 age group growth rate during this period.

Housing

Regional Trends

The region's housing stock grew more slowly during the early 1980s than during the late 1970s. The average annual housing growth rate of the SCAG region from 1975 to 1980 was 2.1 percent. From 1980 to 1984, the number of housing units increased by approximately 217,000 (1.0 percent per year), growing from 4.43 million to 4.65 million (Southern California Association of Governments 1982, Southern California Association of Governments 1988h).

Subregional Distribution. Nearly three-fourths (71.7 percent) of regional housing in 1984 was located in urbanized subregions, with 21.5 percent in urbanizing subregions and 6.8 percent in mountain/desert subregions. Among the six counties in the region, nearly two-thirds (62.9 percent) of all housing units were located in Los Angeles County, and one-sixth (16.4 percent) were located in Orange County in 1984. Of the remainder, 8.8 percent were located in San Bernardino County, 7.0 percent were located in Riverside County, 4.2 percent were located in Ventura County, and 0.7 percent were located in Imperial County.

Household Size. The average size of households in the SCAG region has declined, consistent with statewide and national trends, as a result of increased numbers of single-parent families, reduced birth rates, growth of the elderly population, and other social and economic factors. The average regional household size has dropped steadily since 1960 among all ethnic groups. From 1975 to 1980, household size declined in every county of the region except Los Angeles County (Southern California Association of Governments 1987).

There have been certain exceptions to these general trends. The average size of Hispanic households in the region, for example, increased from 1970 to 1980 after decreasing from 1960 to 1970. Households have also grown larger for economic reasons as a result of the general lack of available or affordable shelter during periods of severe housing shortages or rapid housing cost inflation. (Southern California Association of Governments 1982, Southern California Association of Governments 1988h)

Table 2-8 indicates that average household size regionwide in 1984 was 2.83. Households in 1984 were substantially smaller in outlying (mountain/desert) subregions. Among counties, households were generally smallest in Riverside and San Bernardino Counties, largest in Ventura and Imperial Counties, and close to the regional average in Los Angeles and Orange Counties.

Housing Affordability. Average home prices in the region have escalated dramatically since 1970, making homeownership an elusive goal for most first-time buyers. From 1970 to 1980, the average housing price in the region increased from $26,450 to $100,300 (279 percent). In 1980, the income required to buy an average-priced home was approximately twice the median household income.

Continuing housing price inflation and relatively high interest rates since 1980 have prevented most households from qualifying to purchase a home. A 1988 survey indicated that the SCAG region contained the Standard Metropolitan Statistical Area (SMSA) with the highest national median housing price (Anaheim-Santa Ana, $204,000) and that housing prices increased at the greatest rate from 1987 to 1988 in the Anaheim-Santa Ana and Los Angeles SMSAs (Skidmore 1988). The region's least expensive housing is located in San Bernardino, Riverside, and Imperial Counties, but the desirability of homes in these areas is limited by long commuting distances to employment centers (Southern California Association of Governments 1982).

Rents in the region have also increased substantially as a result of strong rental demand, low growth in the rental housing stock, conversion of existing rental units, rising operating expenses, high interest rates, and speculative property ownership practices. As a result of the shortage of increased cost of rental housing, more households are spending a greater proportion of their incomes on rent and units are shared by families or individuals to minimize their net housing costs. Low-income households must often pay a disproportionately high percentage of their income for housing or accept substandard housing conditions (e.g., overcrowding) because they cannot afford more suitable units.

Homelessness. The SCAG region has more homeless persons than than any other region in the nation. The region's homeless population has been estimated to be at least 50,000 and may be 5-10 times greater. Climate, high housing prices, deinstitutionalization of the mentally ill, and unemployment have contributed to homelessness in the region. Housing market pressures and changes (e.g., housing conversion and displacement), which are often associated with growth, have also contributed to homelessness, although the number of homeless has also grown in areas where there has been little, if any, growth.

Regional Housing Needs Assessment

SCAG is required by state law to review and identify existing and future housing needs every 5 years. The most recent RHNA was adopted by the SCAG Executive Committee on June 30, 1988 (SCAGCEHDC 1988).

The RHNA identifies local jurisdictions' existing housing needs as of January 1, 1987, and projects future housing needs to July 1, 1994. After the RHNA is approved, each city and county must either incorporate the applicable housing projections in the jurisdiction's general plan housing element or provide justification for modifying these projections. RHNA allocations are considered to be "fair share" housing goals for local jurisdictions rather than specific housing development requirements or quotas. (Southern

California Association of Governments 1982, Southern California Association of Governments 1988h, SCAGCEHDC 1988)

"Existing need" is defined in the 1988 RHNA as the proportion of households that have an income equal to or less than 80 percent of the median area income (MAI) and are paying more than 30 percent of their income for housing, based on the 1980 U. S. Census. "Future need" is defined as the number of housing units that would have to be added by 1994 in each jurisdiction within the region to accommodate projected household growth, replace existing units that would be demolished, and achieve optimal vacancy rates (2 percent for single family units and 5 percent for multifamily units). (SCAGCEHDC 1988)

Future need is broken down into four income groups: very low income (below 50 percent of MAI), low income (50 to 80 percent of MAI), middle income (80 to 120 percent of MAI), and upper income (above 120 percent of MAI). State law requires that this allocation process avoid concentration of lower income households in particular communities by reducing the percentage of low- and very low income households in jurisdictions that already exceed the regional average percentage of such households. (These jurisdictions are considered to be "impacted.")

The RHNA includes allocations of lower income households (80 percent of MAI and below) that would reduce the difference between the regional percentage of households that are lower income and the percentage in respective jurisdictions in 1979 by 25 percent by 1994. An additional adjustment has been made in allocations for those jurisdictions with the highest percentage of lower income households to bring these jurisdictions within 10 percent of the regional average. (SCAGCEHDC 1988)

State law provides that SCAG may not consider the effects of certain growth control measures, zoning ordinances, and other land use restrictions when developing housing needs projections for particular jurisdictions. GMA-3, however, is based on the expected effects of growth management measures in certain jurisdictions. State law also provides that the RHNA must take into account various factors when assessing future housing needs, including market demand for housing, employment opportunities, availability of developable land and public facilities, commuting patterns, housing type and tenure, and housing needs of farmworkers (SCAGCEHDC 1988). These factors have been considered in developing housing projections for the proposed project and GMP alternatives. Projections, for example, have been adjusted in GMA-2 and GMA-4 to achieve an improved J/H balance among subregional areas.

Employment

Regional Trends

From 1972 to 1980, regional employment increased by approximately 1.4 million jobs, growing from 4.20 million jobs to 5.59 million jobs. The 1972-1980 average annual growth rate was 3.7 percent. From 1980 to 1984, the average annual employment growth rate declined to 1.4 percent, as

regional employment increased by 331,000 jobs, growing to 5.92 million. (Southern California Association of Governments 1982, Southern California Association of Governments 1988h.)

Subregional Distribution

Approximately 62 percent of all regional jobs added from 1980 to 1984 were located in Orange County, which had both the greatest employment growth rate and largest absolute employment increase among the region's counties during this period. Los Angeles County captured 20 percent of the 1980-1984 employment growth rate but had the smallest employment growth rate of any county in the region except for Imperial County. (Southern California Association of Governments 1982, Southern California Association of Governments 1988h)

More than three-fourths (78.7 percent) of regional jobs in 1984 were located in urbanized subregions, with 17.9 percent in urbanizing subregions and 3.4 percent in mountain/desert subregions. Among the six counties in the region, more than two-thirds (68.4 percent) of all jobs were located in Los Angeles County, and more than one-sixth (17.7 percent) of all jobs were located in Orange County in 1984. Of the remainder, 5.5 percent were located in San Bernardino County, 4.2 percent were located in Riverside County, 3.6 percent were located in Ventura County, and 0.6 percent were located in Imperial County.

From 1975 to 1984, the proportion of total regional employment in Los Angeles County decreased by 5.2 percent (from 73.6 percent), while regional shares increased in Orange County by 4.0 percent (from 13.7 percent), in Riverside and San Bernardino Counties by 0.5 percent (from 3.7 and 5.0 percent, respectively), and in Ventura County by 0.6 percent (from 3.0 percent). The percentage of employment in Imperial County declined by 0.2 percent (from 0.8 percent). Subregional and county employment figures for 1984 are shown in Table 2-3.

Sectoral Distribution. A substantial shift in the region's economic base has occurred in recent years as the southern California economy undergoes a transition from goods-producing manufacturing to information-based services. Between 1972 and 1984, manufacturing employment increased by 239,000 jobs (24.3 percent), while total employment increased by 1.7 million jobs (38.7 percent), which meant that manufacturing dropped from the largest regional employment sector (representing 22.9 percent of all jobs in 1972) to the third largest (20.5 percent of all jobs in 1984). Service employment became the region's largest economic sector during this period, increasing by 583,000 jobs (79.6 percent), as the proportion of regional employment in services grew from 17.1 to 22.2 percent. The most rapid growth has occurred in legal, business, and health services. Agricultural employment increased by 19,000 jobs (34.6 percent) from 1972 to 1984, with its share of regional employment remaining relatively stable at approximately 1.3 percent.

Labor Market. The SCAG region has become a bipolar economy in some respects. There has generally been rapid growth in low-skill, low-wage sectors (e.g., apparel and furniture manufacturing) and high-skill, high-wage sectors (e.g., computer, electrical component, and medical

instrument manufacturing and services), whereas middle-skill, middle-wage sectors (e.g., metals and chemicals manufacturing) have experienced relatively low growth. The region has a large supply of low-skilled labor, including a large proportion of recent immigrants and those who have had minimal education. As discussed in "Public Education" (Chapter 6), student performance levels on a regional basis have generally been low, and school drop-out rates have been high, particularly among Blacks and Hispanics, resulting in decreased opportunities for more highly skilled jobs.

Employment Centers. The largest employment centers in Los Angeles County (i.e., Los Angeles Central Business District, Los Angeles Airport/El Segundo area, Long Beach Harbor area, Hollywood, Commerce, Beverly Hills, Wilshire corridor, and Artesia/Alameda corridor) comprised 10.3 percent of total regional employment in 1980. Major employment centers in Orange County accounted for 3.3 percent of regional employment. (Southern California Association of Governments 1982)

Jobs/Housing Balance

The overall ratio of jobs to housing units for the SCAG region in 1980 and 1984 was 1.27. There is a great imbalance of jobs and housing, however, among subareas of the region. Some areas (referred to as job-rich or housing-poor) have a much higher proportion of jobs to housing units than other areas with substantially lower J/H ratios that are referred to as job-poor or housing-rich. In 1984, there were approximately 140 jobs in Los Angeles and Orange Counties for every 100 housing units but only about half as many (76-80) jobs per 100 housing units in Riverside and San Bernardino Counties. J/H ratios in 1984 for counties and subregions are shown in Table 2-9.

These imbalances tend to perpetuate longer distance work commutes, increase transportation congestion, and reduce the social and economic diversity of communities. Historically, these imbalances have resulted in extensive commuting from primarily residential (bedroom) communities in outlying suburban areas to commercial centers in urbanized areas. J/H imbalances are caused in part by lower housing costs in outlying areas. (Southern California Association of Governments 1988h)

IMPACTS AND MITIGATION MEASURES

Proposed Project

Impact: Net Increase of 5.87 Million Persons, 2.67 Million Housing Units, and 3.03 Million Jobs

Under the proposed project, population in the SCAG region would increase by 5.87 million (47.4 percent), from 12.38 million in 1984 to 18.26 million in 2010. The total number of housing units in the region would increase by 2.67 million (57.4 percent), from 4.65 million in 1984 to 7.32 million in 2010. The total number of jobs in the region would increase during the

same period by 3.03 million (51.2 percent), from 5.92 to 8.95 million. (Southern California Association of Governments 1988h)

These levels of growth would be equivalent to adding the San Francisco Bay Area to the region. Large increases in population, housing, and employment would expand economic activity and opportunities in the region, allow for greater geographic and social mobility, and generally contribute to expansion and diversification of regional resources, including business markets, labor markets, and revenues.

Growth Constraints. Population, housing, and employment growth projections for the proposed project are based on the critical assumption that potential obstacles to growth would not substantially reduce the capacity of the region to absorb high levels of growth. Some of these constraints, however, cannot be resolved easily and may restrict future growth unless extensive mitigation is provided. Future regional infrastructure and resource limitations are expected to include traffic congestion, poor air quality, inadequate water supplies, reduced water quality, uncertainties concerning future energy supplies, and other environmental, social, and economic constraints. Enforcement of certain mitigation measures (e.g., public health regulations concerning air quality, water quality, and hazardous waste) could also slow economic growth directly (e.g., through development moratoria) or indirectly (e.g., by increasing business costs).

Local Growth Management Initiatives. Based on projected growth trends and recent growth control initiatives within the region, it appears likely that there would be strong efforts in many communities to exert greater control over the amount, pace, and quality of future development (e.g., through restrictions on commercial and industrial development or public facilities such as freeways, sewage treatment plants, and landfills). Such efforts could have positive effects by preserving the quality of life in the short term within certain areas, but they could also adversely affect the equitable and efficient allocation of necessary yet less desirable land uses and impede regional land use planning in general (Chapter 5).

Comparison with Department of Finance Population Projections. Recent estimates prepared by the DOF indicate that the population of the region would grow at a lower rate than projected under the proposed project, as shown in Table 4-2, increasing to 17.12 million in 2010 (6.3 percent less than the 18.26 million estimate prepared by SCAG). SCAG projections are 10.4 percent higher than DOF projections for San Bernardino County, 9.9 percent higher for Riverside County, 6.3 percent higher for Los Angeles County, 5.7 percent higher for Orange County, 3.3 percent higher for Ventura County, and 14.5 percent lower for Imperial County (California Department of Finance 1986, Southern California Association of Governments 1988h).

This projection is referred to as GMA-Low in this report. The three most populous counties in California (Los Angeles, San Diego, and Orange) are located in the southern portion of the state. State population projections indicate that four of the five most populous counties in the state will be located in the SCAG region by 2020, with Los Angeles, Orange, San Bernardino, and Riverside Counties ranked 1, 3, 4, and 5, respectively (California Department of Finance 1986).

Table 4-2. Comparison of 2010 Regional Population Projections by County, Southern California Association of Governments (Proposed Project) and California Department of Finance

	Proposed Project		California Department of Finance (DOF)	
County	Number	Percentage of Total	Number	Percentage of Total
Ventura	915,200	5.0	886,000	5.2
Los Angeles	10,231,200	56.1	9,626,000	56.2
Orange	2,982,200	16.3	2,821,600	16.5
Riverside	1,808,100	9.9	1,645,500	9.6
San Bernardino	2,179,300	11.9	1,974,400	11.5
Imperial	140,200	0.8	164,000	1.0
REGION TOTAL	18,256,200	100.0	17,117,500	100.0

Sources: Southern California Association of Governments 1988h
California Department of Finance 1986

Differences between SCAG and DOF projections could result in conflicts concerning local and regional projects, since state agencies (e.g., Caltrans) may use DOF estimates for funding proposed projects. The State Department of Housing and Community Development has accepted the RHNA as meeting requirements of state housing law. In addition, EPA and the State Air Resources Board have accepted the use of SCAG's forecast for the Draft 1988 AQMP.

The population, housing, and employment growth resulting from implementation of the proposed project is considered a significant impact because of the secondary impacts to be generated, such as those related to traffic flow, air quality, water supply and quality, and public service capacity. Those impacts are discussed in this and other chapters of this report.

This impact could be reduced to less than significant through implementation of the following measures.

Mitigation Measures

o Refer to measures in this and other chapters.

Impact: Proportional Decline of the White Population and Growth of the Hispanic, Black, and Asian/Other Populations

Population growth projections under the proposed project from 1980 to 2010 indicate that Whites will become a minority group, as their percentage of the general population will decline from approximately 60 to 40 percent, while the Hispanic population will increase to 40 percent and the percentage of Blacks, Asians, and other ethnic groups will increase to 20 percent (see Figure 4-1). The proportion of these ethnic groups in the 2010 school-age population will be more than 70 percent, as shown in Figure 4-2.

Ninety-five percent of all additional households formed within the region between 1984 and 2010 are expected to be Hispanic, Black, or Asian (Southern California Association of Governments 1987). SCAG has reported that 83 percent of all immigrants to the region have settled in Los Angeles County and that 75 percent of all immigrants have been minority and low income (Southern California Association of Governments 1987).

Projected changes in ethnic composition could substantially affect socioeconomic trends within the region, both positively and adversely. Increased ethnic diversity would expand the social, cultural, and economic opportunities available to residents of the region and generally contribute to expansion and diversification of regional resources, including business markets, labor markets, and revenues. Because of the magnitude and implications of projected changes in ethnicity, however, adverse effects could also result. The changing or mixed ethnic composition of communities could contribute to social conflict, housing segregation, and labor market shortages or skill level deficiencies could impede economic growth. Housing and labor market characteristics, economic development, needs for services, governmental representation, and public policy will also be affected by changes in ethnic composition.

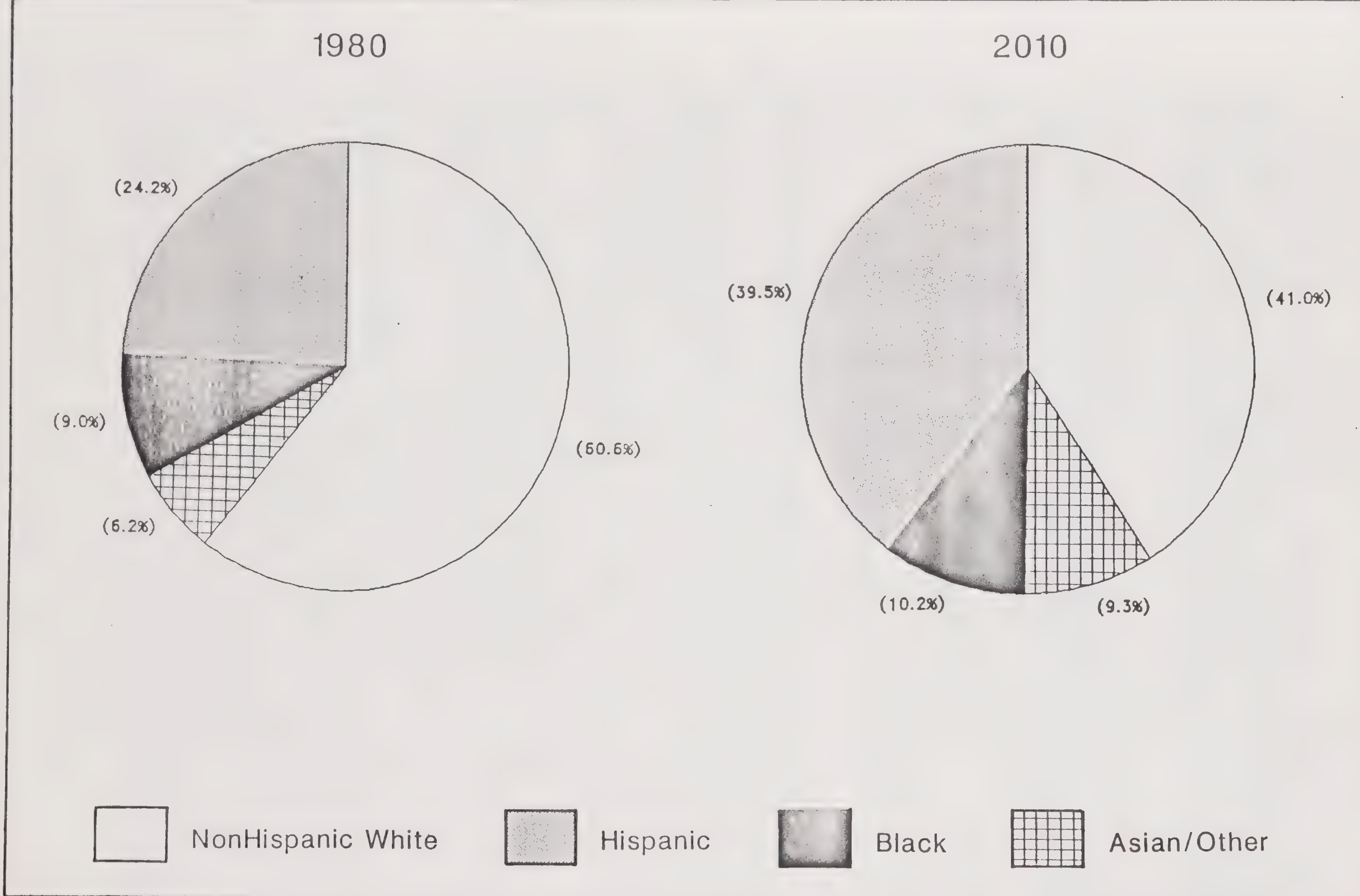


FIGURE 4-1. PROJECTED REGIONAL POPULATION DISTRIBUTION BY ETHNICITY FOR PROPOSED PROJECT AND ALTERNATIVES

Source: SCAG 1982, 1987

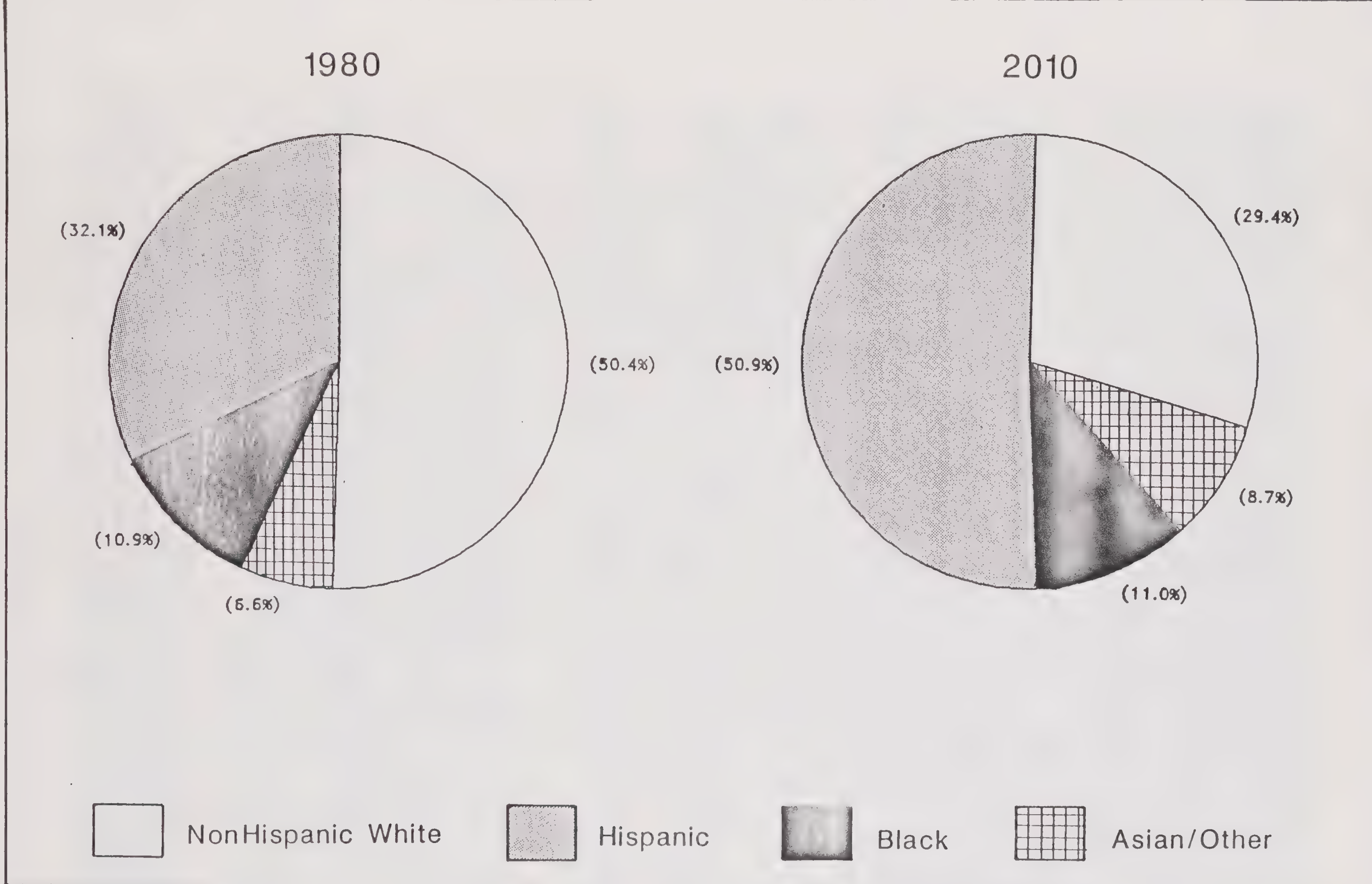


FIGURE 4-2. PROJECTED REGIONAL SCHOOL-AGE POPULATION DISTRIBUTION BY ETHNICITY FOR PROPOSED PROJECT AND ALTERNATIVES

Source: SCAG 1982, 1987

The ethnic diversification and growth that is projected to occur by 2010 has major implications for changes in political representation and redistricting within city, county, and state governments. Various political district boundaries will need to be changed in conformance with the Voting Rights Act to ensure proportional representation of various ethnic groups, particularly Hispanics, Blacks, and Asians.

This impact is considered significant but could be reduced to less than significant through implementation of the following measures.

Mitigation Measures

- Local jurisdictions and other service providers should provide accessible and effective services to members of all ethnic groups in the population, particularly to those with special needs (e.g., immigrants and those from lower income households). Public education, job training, affirmative action, fair housing, child care, health care, and public assistance programs should be expanded and improved. (See housing and employment mitigation measures below and discussion of schools and health care and social services, Chapter 6.)

- Local jurisdictions and community leaders should support efforts to increase the representation of minority groups among elected and appointed positions where such representation has been substantially lower than the proportion of such groups in the general population. Such efforts may include voter registration, community outreach and education, and changes in election or appointment procedures that increase minority group representation.

- Local jurisdictions should implement RHNA and other programs that would increase housing opportunities for lower income ethnic minority households, particularly in areas of the region outside Los Angeles County.

Impact: Growth of the 65+ Age Group and Decline of the 0-17 Age Group

The median age of the region's population would increase by 2010 because the 65-and-over age group is expected to grow at a substantially greater rate (103.1 percent) than the overall population (56.9 percent). The 0-17 age group would experience the least growth (35.6 percent) during this period, while the 18-64 age group would increase by 58.9 percent. As a result of these changes, the proportion of the population in the 0-17 age group would decline from 27.7 percent in 1980 to 23.9 percent in 2010; the proportion of the population in the 18-64 age group would increase from 62.4 to 63.3 percent; and the 65-and-over age group would increase from 9.9 to 12.8 percent of the general population.

As a result of historical economic, housing, and immigration trends, there would probably be substantial socioeconomic differences between the region's elderly population in 2020 and other segments of the population (children, employed heads of households, and other younger adults). Whites would be the dominant ethnic group among the elderly, since this group would largely reflect the existing ethnic composition of the region.

As the ethnic mix of the region shifts, however, Hispanics, Blacks, Asians, and other groups would come to represent a majority of the younger population (e.g., 70.6 percent of all school-age children). The burden of generating funding for needed services would fall primarily on the multiethnic younger population and work force, which is expected to be generally less wealthy than the largely Anglo elderly population. These differences could adversely affect the feasibility of providing services to various segments of the population without increasing social conflict among different ethnic, economic, and age groups.

Aging of the population would have both positive and adverse effects. Beneficial effects would include reduced burdens on schools and other services provided to youth and reduced crime rates. Adverse effects would include increased demands for health care and social services provided to the elderly and increased costs of providing such services. Demand for new forms of housing for the elderly would increase, including options such as second units, accessory units, congregate housing, self-contained "life care" communities, and nursing homes. Conversely, slow growth among younger households could result in less demand for and development of rental housing (Southern California Association of Governments 1987).

This impact is considered significant but could be reduced to less than significant through implementation of the following measures.

Mitigation Measures

- o Local jurisdictions and other service providers should provide accessible and effective services to members of all age groups in the population, particularly to those with special needs (e.g., immigrants, those from lower income households, and the elderly). These entities should expand and improve health care and social services programs as needed to adequately serve a growing elderly population. (See "Health Care and Social Services," Chapter 6.)

- o Public agencies and private organizations should support or provide adequate public education, job training, housing, child care, and public assistance programs for children, families, and younger adults as needed. (See housing and employment mitigation measures below and "Schools and Health Care and Social Services," Chapter 6.)

Impact: Decreased Household Size Could Increase the Demand for Housing and Per Capita Housing Costs and the Demand for Social Services

According to GMP population and housing estimates, the proposed project would result in a decrease in the average regional household size for occupied units from 2.83 persons per unit in 1984 to 2.69 persons per unit in 2010, as shown in Table 2-8.

The average household size for all ethnic groups would decline by 7.9 to 15.5 percent from 1980 to 2010, with the greatest proportional decreases occurring among those groups that currently have the largest households (Hispanics and Asians). This downward trend is expected to be more moderate within the SCAG region than in other regions due to the changing ethnic

mix of this region, because the population of ethnic groups with relatively large households (e.g., Hispanics) is expected to grow most rapidly, while the population of groups with relatively small households (e.g., NH Whites) is expected to grow most slowly.

The principal effects of smaller households would be the potential for increased demand for housing and higher per capita housing costs, both of which could reduce overall housing affordability. Decreased household size could also increase the demand for social services, particularly health care, child care, and family support programs, since households would have less capacity to provide such services for themselves or others on an in-kind basis. However, lower birth rates could minimize the net effect on demand for child care services.

This is a significant impact but could be reduced to less than significant through implementation of the following measures.

Mitigation Measures

o Local jurisdictions and service providers should improve and expand the supply of affordable housing, as called for in the RHNA, and social services, particularly for single-parent families and the elderly, as indicated above. Measures, such as the following, could be considered:

  - identify local housing needs and develop programs to address these needs based on successful models within or outside the region, in conjunction with nonprofit and for-profit developers. Objectives of such programs could include maintaining and improving existing subsidized and below-market-rate housing, constructing new below-market-rate units, providing financial and technical housing assistance to lower income households (e.g., through sweat equity rehabilitation and new construction projects), promoting redevelopment projects that improve or increase the stock of affordable housing, and acquiring or reserving sites for affordable housing projects (landbanking);

  - expand existing funding and develop new funding sources as needed to support housing programs. Financing sources could include tax increment revenues within redevelopment areas, Community Development Block Grant funds, state housing programs, inclusionary housing fees, and corporate and foundation contributions. Mechanisms such as local or regional housing trust funds and community development loan funds could be developed to most effectively address community needs with available resources; and

  - implement measures discussed in the "Health Care and Social Services" section of Chapter 6.

Impact: Potential for Decreased Housing Affordability

A portion of the population in the SCAG region has been priced out of the housing market because of escalating home prices and rents, and this

problem appears to be worsening in the region as a result of strong demand, low vacancy rates, and other factors. Projected levels of population growth indicate continuing strong levels of housing demand in the region, which could encourage further increases in housing costs. Substantial new housing development could also result in land and housing price inflation since the overall supply of developable land would be reduced, inflating both the cost of remaining land and the value of existing units. This impact is considered potentially significant, but could be reduced to less than significant with implementation of the following measures.

Mitigation Measures

- o Same as identified immediately above for the "Decreased Household Size" impact.

Impact: Growth in the Share of Employment in the Services Sector and Decline of the Share of Employment in the Manufacturing Sector (As Well As Changes Within the Sector)

The trend from a manufacturing-based economy toward a service-based economy is expected to continue under the proposed project. More than 40 percent of all regional job growth from 1984 to 2010 is expected to consist of employment in the service sector, doubling total service employment. By 2010, nearly 30 percent of all regional employment is projected to be in services. Most high-tech, high-skill sectors within the service sector (e.g., business, computer, legal, and health services) are predicted to grow rapidly. (Southern California Association of Governments 1987)

In contrast, manufacturing's share of regional employment is projected to decline to 17 percent by 2010. Manufacturing would remain the region's third largest employment sector (behind services and trade), but only 10 percent of regional job growth would occur in this sector, and the growth rate of manufacturing employment would be relatively low at 24.7 percent. The only sectors with lower growth rates would be government (23.8 percent), agriculture (9.1 percent), and mining (no growth). (Southern California Association of Governments 1987)

During the next 25 years, high tech employment within the manufacturing sector is likely to continue its steady growth. In the low skill, low wage area, furniture is expected to continue its rapid growth while the apparel industry is forecast to reverse its trend and actually lose employment during the period. Other low skill manufacturing sectors will undergo slow or negative growth. Most of the high tech, high skill sectors within the service sector are predicted to grow at a very rapid pace, including business, computer, legal, and health services.

Employment growth is expected to shift from industries with a high proportion of low-skilled jobs to industries with proportionately more high-skilled jobs. A large supply of low-skilled labor exists in the region and will be increased by continuing immigration. Based on these labor market trends, an oversupply of low-skilled labor is expected (at least in the short term). Substantial changes in the composition of the labor force could also occur as a

result of migration within the United States. (Southern California Association of Governments 1987)

This oversupply would result in increased unemployment and needs for social services, and could also increase crime and social conflict. A 5.5-percent unemployment rate was assumed for 2010, but this rate could be higher if a general economic downturn or oversupply of low-skilled labor occurs. Conversely, labor shortages could slow the growth rate of economic sectors that are more heavily dependent on highly skilled labor (e.g., in high-technology industries), discourage the location of such firms, or increase the rate at which existing firms relocate to other regions where labor market conditions are more favorable.

This impact is considered significant but could be reduced to less than significant through implementation of the following measures.

Mitigation Measures

- Local jurisdictions, employers, and service agencies should implement measures to upgrade skill levels and adapt to changes in the economy, such as:
  - job retraining of low-skilled workers for middle- and high-skilled jobs; and
  - job retraining of displaced workers due to structural changes in the economy; and
  - improving primary, secondary, and higher education programs to prepare the future labor force for future job opportunities; and
  - providing opportunities in small-to-medium sized businesses where most new job creation would occur.

Impact: Continuing Jobs/Housing Imbalance Among Subregions and Counties

The existing regional and subregional imbalance of jobs and housing results in various adverse effects, including increased commuting distances and traffic congestion, degraded air quality, increased energy consumption, and a reduced range of employment opportunities available to residents who live in areas distant from employment centers. (Southern California Association of Governments 1982)

The regional J/H ratio is expected to decline from 1.27 (1984) to 1.22 (2010) under the proposed project, based on a greater proportional increase in housing units than in employment. Other socioeconomic factors, including declining household size and aging of the general population, could also be contributing factors.

The proposed project includes adjustments to improve the projected regional J/H balance among subareas. Approximately 9 percent of future employment growth would be redirected from job-rich (high J/H ratio) to job-poor (low J/H ratio) areas, and approximately 4.5 percent of future

housing growth would be redirected from housing-rich (low J/H ratio) to housing-poor (high J/H ratio) areas. The objective of this J/H strategy is to bring the respective unadjusted ratios of added employment and housing growth in the 23 subregional areas 20 percent closer to the regional J/H ratio.

The proposed project would improve the existing J/H imbalance within all counties in the region, with the exception of Los Angeles and Imperial Counties. The most positive effects would occur in Imperial and Ventura Counties. Imperial County's ratio of 1.11 would increase to 1.26 (74 percent closer to the regional average in 2010 than in 1984). Ventura County's ratio of 1.08 would increase to 1.10 (33 percent closer to the regional average). Ratios in Riverside and San Bernardino Counties would remain relatively stable, moving 9 percent closer to the regional average (Table 2-10).

The proposed project would further increase Orange County's relatively high ratio from 1.38 to 1.42 (moving 85 percent further from the regional average from 1984 to 2010). The ratio in Los Angeles County would decrease from 1.39 to 1.37 (moving 25 percent further from the regional average).

Under the proposed project, the urbanized subregional ratio would increase from 1.40 to 1.42, moving 56 percent further from the regional average. On the other hand, the urbanizing subregional ratio would remain stable at 1.06 (moving 18 percent closer to the regional average) and the relatively low mountain/desert ratio would increase from 0.63 to 0.67, moving 11 percent closer to the regional average.

Although the proposed project would improve the J/H ratios in some subareas relative to 1984, a J/H imbalance would still exist in 2010. Therefore, the effects of a J/H imbalance, such as increased commuting distances and traffic congestion, degraded air quality, increased energy consumption, and reduced close-in employment opportunities would continue. This impact is considered significant but could be reduced to less than significant through implementation of the following measures.

Mitigation Measures

- Subregional and local jurisdictions should implement strategies to improve the regional and subregional J/H imbalance. The following measures could be considered:

  - in housing-poor areas, increase the amount and density of planned future residential development and/or reduce the amount of planned future commercial and industrial development through general plan revisions, zoning ordinances, and development incentives or conditions. Implementation of such measures could be a condition of consistency with regional plans and regulatory compliance;

  - in job-poor areas, increase the amount of planned future commercial and industrial development and/or reduce the amount of planned future residential development through general plan revisions and zoning ordinances, and development incentives or conditions.

Implementation of such measures could be a condition of consistency with regional plans and regulatory compliance, as applicable;

- impose developer fees on commercial and industrial projects in job-rich subregions to cover external costs associated with imbalanced development, and use fee revenues to build regional transportation infrastructure, mitigate air pollution effects of imbalanced growth, increase economic development programs in job-poor subareas, and facilitate housing development in job-rich subareas;

- impose developer fees on housing projects in housing-rich subregions to cover external costs associated with imbalanced development and use fee revenues as described above;

- revise and enforce air quality regulations (e.g., the South Coast Air Quality Management District New Source Review Rule and the Regional Air Standards Attainment Plan) to support J/H balance by restricting economic development in job-rich areas and favoring economic development in job-poor areas;

- monitor J/H balance performance as a condition of "Reasonable Further Progress" under the 1988 AQMP and restrict the flow of federal funds to those areas which fail to comply;

- encourage redevelopment projects in job-poor areas;

- reallocate property and sales tax revenues from job-rich to job-poor areas by developing an intraregional tax-revenue sharing system similar to the one established in the Minneapolis-St. Paul, Minnesota region since 1975;

- implement growth management programs on a regionwide level by using local police powers to provide for more balanced growth (e.g., by phasing or structuring capital improvement programs so as to shape the pattern and timing of growth and by enacting ordinances requiring that growth be restricted as necessary to maintain minimum levels of service provided by local infrastructure systems);

- expand and improve infrastructure systems (e.g., transportation, wastewater, schools, and recreation facilities), giving highest priority to projects that would promote job growth in job-poor areas or would promote housing growth in housing-poor areas, limiting funding for projects that would generate employment growth in job-rich areas or would generate housing growth in housing-rich areas, by jointly developing and funding a regional capital improvement program or establishing intergovernmental agreements;

- encourage economic development in outlying job-poor areas by promoting the development of an extensive and active telecommunications network in the region that facilitates business location and development in those areas;

- target limited state and federal economic development funds (where possible), with highest priority given to projects that promote job

growth in job-poor areas (targeting jobs that match the skill levels of the unemployed and underemployed in those areas and assist residents of job-poor areas in relocating to areas with expanding job opportunities);

- establish consistency with regional J/H balance objectives as a prerequisite or condition of incorporations approved by Local Agency Formation Commissions; and

- implement measures that would further housing development objectives of the RHNA, including the increased use of tax-increment revenues and inclusionary zoning fee revenues (generated by commercial and industrial development) for development of affordable housing.

GMA-1

Impact: Regional Population, Housing, and Employment Growth

The aggregate amount of population, housing, and employment growth at the regional level that would result from GMA-1 would be equivalent to that which would occur under the proposed project, as shown in Tables 2-1, 2-2, and 2-3.

For the reasons indicated above, this impact is considered significant, but it could be reduced to less than significant through implementation of the following measures.

Mitigation Measures

o Same as those identified for the proposed project.

Impact: Increased Ethnic Diversity and Shifts in Population Age Distribution

Projected changes in the ethnic composition and population age distribution that would result from GMA-1 would be comparable to those that would occur under the proposed project.

These impacts are considered significant but could be reduced to less than significant through implementation of the following measures.

Mitigation Measures

o Same as those identified for the proposed project.

Impact: Reduced Household Size and Potential for Decreased Housing Affordability

Projected changes in the average size of households on a regional and subarea level that would result from GMA-1 would be comparable to those that

would occur under the proposed project. Household size would be slightly greater in the urbanized subregion and slightly lower in the urbanizing subregion.

Impacts on housing affordability would also be comparable on a regional level to the proposed project.

These impacts are considered significant but could be reduced to less than significant through implementation of the following measures.

Mitigation Measures

- Same as those identified for the proposed project.

Impact: Shifts in the Regional Economy

Projected shifts in the regional economy that would result from GMA-1 would be comparable to those that would occur under the proposed project.

This impact is considered significant but could be reduced to less than significant through implementation of the following measures.

Mitigation Measures

- Same as those identified for the proposed project.

Impact: Continuing Jobs/Housing Imbalance Among Subregions and Counties

GMA-1 would worsen the existing J/H imbalance within all counties except Imperial County. The most adverse effects would occur in Orange County where the ratio of 1.38 would increase to 1.57 (226 percent farther from the regional average in 2010 than in 1984). Amongst the subregions, the most adverse effect would occur in the urbanized subregions where the ratio of 1.40 would increase to 1.52 (139 percent farther from the regional average in 2010 than in 1984).

Projected changes in the J/H balance that would result from GMA-1 would be substantially more adverse than those that would occur under the proposed project. The J/H imbalance would worsen among all counties and subregions because J/H ratios in job-rich subareas would rise further above the regional average and J/H ratios in job-poor subareas would drop further below the regional average.

For the reasons indicated for the proposed project, this impact is considered significant, but it could be reduced to less than significant through implementation of the following measures.

Mitigation Measures

- Same as those identified for the proposed project.

GMA-2, GMA-3, and GMA-4

Regional Population, Housing, and Employment Growth

The aggregate amount of population, housing, and employment growth at the regional level that would result from GMA-2, GMA-3, and GMA-4 would be equivalent to that which would occur under the proposed project, as shown in Tables 2-1, 2-2, and 2-3.

Increased Ethnic Diversity and Shifts in Population Age Distribution

Projected changes in the ethnic composition and population age distribution that would result from GMA-2, GMA-3, and GMA-4 would be comparable to those that would occur under the proposed project.

Reduced Household Size and Potential for Decreased Housing Affordability

Projected changes in the average size of households on a regional and subarea level that would result from GMA-2, GMA-3, and GMA-4 would be generally comparable to those that would occur under the proposed project, as shown in Table 2-8. Household size would be slightly less under GMA-2 in the urbanizing subregion and slightly greater under GMA-3. In the mountain/desert subregion, household size would be slightly less under GMA-3.

Shifts in the Regional Economy

Projected shifts in the regional economy that would result from GMA-2, GMA-3, and GMA-4 would be comparable to those that would occur under the proposed project.

Continuing Jobs/Housing Imbalance Among Subregions and Counties

As compared to the proposed project, the J/H ratio for Riverside and Imperial Counties would move farther away from the regional ratio under all three alternatives; in San Bernardino County, the ratio would improve or remain the same. For Ventura, Los Angeles, and Orange Counties, the movement of the ratios depends on the alternative. GMA-2 improves the ratio for Los Angeles and Orange Counties; and GMA-3 and GMA-4 improve the ratio for Ventura County.

As compared to GMA-1, all three alternatives (GMA-2, GMA-3, and GMA-4) would improve the J/H ratio in all six counties and three subregions.

GMA-Low

The region's population, housing stock, and economy would grow at a slower rate from 1984 to 2010 under GMA-Low than under the proposed project or GMA-1. At the regional level in 2010, GMA-Low would result in a population of 17.14 million (1.12 million or 6.1 percent less than the level projected for the proposed project and GMA-1), 7.32 million housing units (162,500 units or 2.2 percent less than the level projected for the proposed project and GMA-1), and 8.74 million jobs (214,600 jobs or 2.4 percent less than the level projected for the proposed project and GMA-1).

For the purposes of this analysis, it is assumed that the ethnic and age distribution of the region's population in 2010 under GMA-Low would be the same as forecast by SCAG for GMA-1 (Southern California Association of Governments 1987). Effects of increased ethnic diversity and an older population would therefore be comparable to those described in Chapter 4 for the other alternatives, except that there would be a smaller number of persons in all ethnic and age groups.

Household size would be lower in all subregional areas under GMA-Low than under the proposed project and GMA-1, resulting in generally higher levels of housing demand, higher per capita housing costs, and greater proportional demand for social services than would occur under the latter.

Since the proportional distribution of employment among industrial sectors is assumed to be similar for all alternatives, regional economic shifts expected to occur under the proposed project and GMA-1 would also occur under GMA-Low.

The J/H imbalance resulting from GMA-Low would be somewhat greater than that which would occur under the proposed project and substantially less than that which would occur under GMA-1.

GMA-High

The region's population, housing stock, and economy would grow at a greater rate from 1984 to 2010 under GMA-High than under the proposed project or GMA-1. At the regional level in 2010, GMA-High would result in a population of 20.20 million (1.94 million or 10.6 percent more than the level projected for the proposed project and GMA-1), 8.09 million housing units (771,000 units or 10.5 percent more than the level projected for the proposed project and GMA-1), and 9.29 million jobs (337,000 jobs or 3.8 percent more than the level projected for the proposed project and GMA-1).

For the purposes of this analysis, it is assumed that the ethnic and age distribution of the region's population in 2010 under GMA-High would be the same as forecast by SCAG for GMA-1 (Southern California Association of

Governments 1987). Effects of increased ethnic diversity and an older population would therefore be comparable to those described in Chapter 4 for the other alternatives, except that there would be a greater number of persons in all ethnic and age groups.

Household size in all subregional areas would be comparable under GMA-High to estimates for the proposed project and GMA-1, resulting in housing demand, per capita housing costs, and demand for social services similar to those that would occur under the latter.

Since the proportional distribution of employment among industrial sectors is assumed to be similar for all alternatives, regional economic shifts expected to occur under the proposed project and GMA-1 would also occur under GMA-High.

The J/H imbalance resulting from GMA-High would be somewhat greater than that which would occur under the proposed project and substantially less than that which would occur under GMA-1.

CHAPTER 5. LAND USE AND CULTURAL RESOURCES

LAND USE

Setting

Historically, settlement and land use patterns within the SCAG region have focused on coastal areas framed by foothills and high mountains. Inland mountain and desert areas have been largely devoid of either agricultural or urban development, except for portions of the Coachella and Imperial Valleys that have been transformed by irrigation into very productive agricultural areas.

The coastal plains and valleys constitute a small portion of the region's land area but contain the vast majority of the region's population and urbanized lands. The formerly rural landscape of coastal areas was transformed by the region's economic expansion and population growth following World War II as freeways, shopping centers, office buildings, and large residential subdivisions replaced citrus orchards and farms. Urbanization has substantially altered regional land use patterns (e.g., by conversion of agricultural, open space, and undeveloped lands to urban uses, including residential development of foothill and canyon areas).

The SCAG region contains approximately 38,500 square miles, or 24.65 million acres. In 1979, approximately 72 percent of the regional land area (including surface water bodies and preserves) was undevelopable, 13 percent was vacant, and the remaining 15 percent was developed. Nearly one-third of developed land was in urban use, and another third was used for agriculture. Nearly two-thirds of urban lands were in residential use. Agricultural land (much of which contained prime soils as classified by U. S. Soil Conservation Service) totaled 1.1 million acres in 1979 and was primarily concentrated in the Coachella, Imperial, and Santa Clara Valleys. (Southern California Association of Governments 1982)

More than 5.6 million acres of developable land, representing 23 percent of the region's land area, remained in 1979, with the large majority of this land located in eastern interior valleys and desert or semidesert areas. Developable lands are those areas considered both available and suitable for development (i.e., vacant lands free of hazards with less than 25 percent slope, agricultural lands, and existing urban areas subject to recycling and conversion).

Land Use and Housing Density

Population density estimates for subregional areas in 1984 range from 5,730 to 11,680 persons per square mile (p/sm) in urbanized subregions, 2,080 to 5,480 p/sm in urbanizing subregions, and 500 to 3,630 p/sm in mountain/desert subregions. Central Los Angeles, Southeast Orange County, and Imperial had the highest reported densities among urbanized, urbanizing, and mountain/desert subregions, respectively.

Density patterns and standards (e.g., perceptions of what constitutes overcrowding or undesirably high development densities) are influenced by various factors, including cultural norms, land constraints, and housing costs. Increased density has both positive and negative effects, including greater social activity, cultural diversity, and economies of scale.

Since 1970, residential densities have increased in the region, reflecting higher levels of multifamily unit construction, conversion of older units, and development of newer subdivisions on smaller lots. In 1979, the average number of dwelling units per residential acre in the region was 6.00, ranging from 6.77 in Los Angeles County to 1.95 in Imperial County. Los Angeles County also had the highest proportion (41 percent) of multifamily housing units among all counties, whereas only 5 percent of all housing units in Imperial County were classified as multifamily in 1979. The number of multifamily units in the region has increased substantially as a result of high housing costs, land costs, and consumer preferences. (Southern California Association of Governments 1982)

Impacts and Mitigation Measures

The following discussion of land use impacts of the proposed project and alternatives is generalized and qualitative. Certain estimates have been made based on comparison of the Draft GMP with land use analysis of the previously adopted SCAG growth forecast in the Final Supplemental Environmental Impact Report on Modifications to SCAG-82 Growth Forecast Policy (Southern California Association of Governments 1985a). The Draft GMP population forecast for 2010 is approximately 2.5 million (16 percent) higher than the modified SCAG-82 projections. It was assumed for purposes of this analysis that development densities for these two forecasts were comparable.

Proposed Project

Impact: Urbanization of Approximately 600,000 Acres and Conversion of Agricultural and Open Space Lands. Between 1980 and 2010, significant land use changes would occur in the region, including the intensification of urban densities in already urbanized areas and the conversion of undeveloped or agricultural lands to new urban uses. Approximately 650,000 acres of land would be converted from nonurban to urban use (representing a 50-percent increase in urbanized land area), resulting in a regional total of approximately 1.8 million acres of urban land in 2010 (Southern California Association of Governments 1985a, 1987).

The highest rates of conversion of land to urban uses would probably occur in Ventura, San Bernardino, and Riverside Counties based on growth projections at the county level and the relatively large amounts of developable land remaining in these areas.

Urbanization would result in increased traffic congestion, degraded air quality, increased demands for public services, adverse effects on ecological resources, and other environmental challenges, as described in this report. Further conversion of open space buffer areas and agricultural lands adjacent to urban areas would be especially important because of the aesthetic, recreational, and productive values of such areas and lands and their increasing scarcity.

This impact is considered significant and unavoidable. The following measures should be implemented, however, to reduce this impact to the greatest extent possible.

Mitigation Measures

- Refer to measures in this and other chapters.
- Local jurisdictions should limit the extent and adverse effects of urbanization of open, vacant, undisturbed, or agricultural lands by encouraging infill development at increased densities in areas that are already urbanized or are designated for urbanization rather than development of rural or outlying areas; land use controls that discourage development of prime agricultural land; and encouraging the preservation and development of open space areas and parks within highly urbanized areas.

Impact: Incorporations and Annexations. Based on historical patterns, projected population growth and urbanization is expected to result in incorporations of new cities and major annexations to existing cities in the region. Incorporations would most probably occur in rapidly urbanizing unincorporated areas of counties where densities make incorporation feasible and desirable. Annexations would be most likely to affect areas contiguous to existing city boundaries that experience substantial growth and increased demand for public services. In addition to incorporations and annexations, the proposed project would result in the creation, expansion, modification of special service districts. (Southern California Association of Governments 1987)

Incorporations and annexations would have both positive and adverse effects, including increased tax bases and economies of scale for municipalities, decreased tax bases and economies of scale for unincorporated areas, and greater challenges in integrating growth management, land use, and other public policies among a growing number of local jurisdictions. Because of adverse fiscal and public services effects that could result in unincorporated areas, increased demands on municipal governments and service providers, and increased constraints placed on efforts to integrate planning efforts among local jurisdictions, this impact is considered potentially significant. This impact could be reduced to a less-than-significant level through implementation of the following measure.

Mitigation Measures

- o Eligible voters, local jurisdictions, Local Agency Formation Commissions, and applicable regional and state agencies should authorize incorporations, annexations, and special district formations or changes that would result in the maximum feasible conservation of undeveloped land, the most efficient delivery of public services, and the least fiscal imbalance among all affected jurisdictions.

GMA-1

Impacts: Urbanization of Approximately 600,000 Acres, Conversion of Agricultural and Open Space Lands, and Incorporations and Annexations. The impacts of urbanization, land conversion, and jurisdictional changes that would occur under GMA-1 would be comparable to those described above for the proposed project. Based on lower forecasts of residential development in outlying areas, where land is less expensive and housing densities are generally lower than in urbanized coastal areas, GMA-1 would be expected to result in a lower rate of urbanization and conversion of open space and agricultural lands than the proposed project.

These impacts are considered significant and unavoidable but could be reduced through implementation of the following measures.

Mitigation Measures

- o Same as those identified for the proposed project.

GMA-2, GMA-3, and GMA-4

Regional land use effects that would occur under these alternatives would be similar to those identified for the proposed project.

CULTURAL RESOURCES

Setting

Many areas of southern California can be expected to contain significant cultural resources because of their long prehistoric occupancy, the relative density of historic and prehistoric sites that have been preserved, and the region's semiarid climate. By 1981, more than 13,000 archeological sites within the region were identified, including nearly 1,000 that had received federal or state designations as historic sites (Table 5-1).

These estimates of known archeological sites serve only as general indices of possible site density since surveys have been limited to less than 10 percent of the total regional land area, largely to areas proposed for development. No reasonable approximation of total sites or site density is therefore possible on a local, county, or regional basis.

Table 5-1. Regional Cultural Resources

County	Surveyed Archeological Sites	Federal- and State-Designated Historical Sites[a]	Approximate Percentage of Area Surveyed
Ventura	727	85	10
Los Angeles	1,111	310	20
Orange	993	150	25
Riverside	2,200	165	less than 5
San Bernardino	4,309	180	less than 5
Imperial	3,916	40	less than 5
Regional Total	13,256	930	less than 10

[a] In addition, several thousand locally, city-, or county-designated historical or cultural landmarks are estimated to be within the region. Most are in urbanized portions of Los Angeles, Orange, Ventura, and Riverside Counties.

Source: Southern California Association of Governments (1987) based on 1981 data from the California State Office of Historic Preservation and the U. S. Army Corps of Engineers.

Identified sites are located predominantly in San Bernardino, Imperial, and Riverside Counties. Most historic sites are located in urbanized areas, primarily in Los Angeles County. The greatest concentration of undiscovered sites probably occurs in mountain, desert, and coastal areas that are presently vacant and unavailable or unsuitable for development by 2000.

Stringent mitigation and protection measures are required when new sites are discovered as a result of development activities. Cultural resource surveys are generally required prior to approval of land use changes that are subject to environmental review under CEQA and the National Environmental Policy Act. (Southern California Association of Governments 1987)

Impacts and Mitigation Measures

Proposed Project

Impact: Possible Damage, Destruction, or Removal of Recorded or Unrecorded Cultural Resources. Recorded cultural resource sites may be located on or near areas proposed for development. Cultural resources from these sites could be damaged or destroyed by construction activities and displaced from their environmental context. Displacement of artifacts minimizes their potential for contributing to further studies of prehistoric or historic cultures. This impact would be significant.

Implementation of the following measures would reduce this impact to less than significant.

Mitigation Measures

- Local jurisdictions should require that the following measures be undertaken, prior to approving development, to protect cultural resources:
  - Map areas of prime cultural resource significance.
  - Consult with the appropriate archeological or historical information center and clearinghouse (i.e., University of California at Los Angeles, University of California at Riverside, San Bernardino County Museum, or Imperial Valley College Museum) to identify known cultural resources and potential cultural resources that could be found on land proposed for development.
  - Implement an archeological field survey if a development area is identified as "sensitive." If the field survey identifies significant cultural resources, preservation and mitigation measures should be recommended.

GMA-1

Impact: Possible Damage, Destruction, or Removal of Recorded or Unrecorded Cultural Resources. Impacts to cultural resources under GMA-1 would be comparable to those described above for the proposed project. This impact is considered significant. The following measures would be required to reduce this impact to less than significant.

Mitigation Measures

- Same as those identified for the proposed project.

GMA-2, GMA-3, and GMA-4

Regional impacts to cultural resources under these alternatives would be similar to those identified for the proposed project.

GMA-Low

Assuming that development densities and locational patterns under GMA-Low would be comparable to those occurring under the proposed project and GMA-1, less acreage within the region would be urbanized, and agricultural and open space lands would be converted to other uses at a slower rate in most areas of the region, particularly in Los Angeles, Riverside, and San Bernardino Counties, where the greatest differences in housing and employment growth rates among these alternatives are projected. Fewer incorporations and annexations would also be expected to occur under GMA-Low as a result of lower levels of land development.

Since land development would not occur as rapidly under GMA-Low as under the other alternatives, the likelihood that cultural resources within the region would be damaged, destroyed, or removed would be somewhat less. Effects on cultural resources, however, would depend on the location and nature of particular development projects.

GMA-High

Assuming that development densities and locational patterns under GMA-High would be comparable to those occurring under the proposed project and GMA-1, more acreage within the region would be urbanized, and agricultural and open space lands would be converted to other uses at a greater rate in most areas of the region, particularly in Ventura, Riverside, and San Bernardino Counties, where the greatest differences in housing and employment growth rates among these alternatives are projected. More incorporations and annexations would also be expected to occur under GMA-High as a result of greater levels of land development.

Since land development would occur more rapidly under GMA-High than under the other alternatives, the likelihood that cultural resources within the region would be damaged, destroyed, or removed would increase.

Effects on cultural resources, however, would depend on the location and nature of particular development projects.

CHAPTER 6. PUBLIC SERVICES

WATER SUPPLY AND QUALITY

Setting

Existing Water Sources and Uses

Local Supplies. Local surface water sources and groundwater basins provide about one-third of the region's water supply. The largest surface water sources in the region are the Colorado River and the Santa Ana and Santa Clara River systems. Major groundwater basins in the region include the Central, Raymond, San Fernando, and San Gabriel Basins (Los Angeles County); the Upper Santa Ana Valley Basin system (San Bernardino and Riverside Counties); the Coastal Plain Basin (Orange County); the Coachella Valley Basin (Riverside County); and the Oxnard Plain Basin (Ventura County).

Local water resources are fully developed and are expected to remain relatively stable in the future on a regionwide basis. However, local water supplies may decline in certain localized areas and increase in others. Several groundwater basins in the region are threatened by overdrafting, increasing levels of salinity, and contamination by toxics or other pollutants. Local supplies may also be reduced by conversion of agricultural land to urban development, thereby reducing the land surface available for groundwater recharge. The future use of groundwater could also be limited by water quality, since levels of salinity in sources currently used for irrigation could be unacceptably high for domestic use, requiring demineralization prior to such use.

Imported Supplies. Approximately 64 percent of the SCAG region's water supply is imported from other areas of the state. Several major conveyance systems bring water to the urbanized portion of the region from northern California, via the State Water Project (SWP); the Sierra Nevada, via the Los Angeles Aqueducts; and the Colorado River, via the Colorado River Aqueduct. The All-American/Coachella Canals deliver agricultural irrigation water from the Colorado River to the Coachella and Imperial Valleys.

The continued availability of water from these sources is uncertain at current levels. The firm or dependable yield of the SWP system, based on existing facilities, is expected to decrease by 2000 as water use in areas of origin in northern California increases, Central Valley Project (CVP) contractual obligations increase, and users with prior rights to northern California water supplies exercise those rights (Southern California Association of Governments 1987).

The amount of water that California imports from the Colorado River (including surplus flows) is expected to decline substantially in the near future when the Central Arizona Project (CAP) becomes fully operational by the early 1990s. The Metropolitan Water District of Southern California's (MWD's) annual apportionment of Colorado River water would be reduced by approximately 620,000 million acre-feet (MAF) (55 percent) from 1.21 MAF to 0.55 MAF as a result of the CAP and increased water use by upper Colorado River basin states. Annual apportionments to the Imperial Irrigation District, Coachella Valley Water District, and Palos Verdes Irrigation District, which currently total 300,000 AF, would be eliminated by operation of the CAP. (California Department of Water Resources 1987)

State Water Project. If additional water supplies are not secured, SWP contractors in the region will face increasing risks of water supply deficiencies during dry years. Of the 1.86 MAF in maximum SWP entitlements held by contractors in the MWD service area for 1988, a total of 1.08 MAF in approved orders were processed (58 percent of maximum entitlements) due to facilities constraints. Maximum entitlements to these contractors are scheduled to increase to 2.0115 MAF per year in 1990 (Horne pers. comm.).

Efforts to increase dependable yields through the SWP have included a Coordinated Operation Agreement between the State and the U. S. Bureau of Reclamation, completion of additional pumping capacity in the Delta, development of additional offstream storage facilities, and water transfers from agricultural to urban SWP contractors. Statewide estimates indicate that annual net use of SWP supplies will increase by 800,000 AF (33 percent) from 1985 to 2010, increasing from 2.4 MAF to 3.2 MAF. The SWP would not be able to meet this increased demand in most years with existing facilities but could do so in approximately 4 of every 5 years, assuming that existing facilities are expanded as planned (California Department of Water Resources 1987).

Los Angeles Aqueducts. The Los Angeles Aqueducts currently provide nearly 470,000 AF per year or 80 percent of the water supply for the City of Los Angeles. However, pending or future litigation and legislation aimed at reducing both the diversion of water from the Mono Basin and groundwater pumping in the Owens Valley could lessen this yield substantially.

Colorado River. Because of an increase in the use of entitlements by users in Arizona, the dependable supply of Colorado River water allocated to the MWD has been reduced from 1.212 MAF to 0.55 MAF per year, and is conservatively projected at 0.47 MAF per year by MWD staff (Chan pers. comm.). The Imperial Irrigation District, Palos Verdes Irrigation District, and Coachella Valley Water District hold priority to the first 3.85 MAF of California's 4.4 MAF apportionment of Colorado River water. Strategies for transferring the use of these supplies from agricultural to urban uses are currently being investigated by the MWD.

Subregional Assessments

Water demand and supply projections shown in Table 6-1 consider two major subregions. The largely urbanized coastal plain subregion includes all of Orange County, most of Los Angeles County, large portions of Ventura County and Riverside County, and a smaller portion of San Bernardino County. The outlying subregion includes all of Imperial County, northern Ventura County, northern Los Angeles County, eastern Riverside County, and the remainder of San Bernardino County. Subregions are shown in Figure 6-1.

Coastal Plain Subregion. The 1984 population of the coastal plain subregion was approximately 11.08 million (89 percent of the regional total). Approximately 2.84 MAF (2,536 MGD) of water was utilized in this subregion in 1984 by urban and agricultural uses, which represented 89 and 11 percent of regional water demand, respectively. About one-third of the water used in that year was derived from groundwater supplies and local sources; the remainder was imported from the Colorado River, the Sacramento Delta (through the SWP) and the Owens/Mono basins (through the Los Angeles Aqueducts).

If untreated, water degraded by increased levels of salts, nitrates, and other pollutants could render certain groundwater in basins in this subregion unsuitable for domestic consumption.

Outlying Subregion. The 1984 population of the outlying subregion was approximately 1.37 million (11 percent of the regional total). Most areas of the outlying subregion are heavily dependent on local surface and groundwater resources as major sources of supply for both domestic and agricultural uses. Supplemental supplies are also currently available in some areas through SWP contractors. The largest source of supply in this subregion is the Colorado River. The Imperial Irrigation District, Coachella Valley Water District, and Palos Verdes Irrigation District hold priority to 3.85 MAF annually of Colorado River Water.

Past population growth and agricultural development have resulted in groundwater pumping that has greatly exceeded safe yield levels. Many major groundwater supply sources in this subregion are overdrafted, including the Oxnard Plain Basin (Ventura County), Antelope Valley Basin (north Los Angeles County), Mojave Basin (San Bernardino County), and the Coachella Valley Basin (Riverside County). As in the coastal plain subregion, water degraded by increased levels of salts, nitrates, and other pollutants could render certain groundwater in basins in this subregion unsuitable for domestic consumption if untreated.

Water Service Providers

Metropolitan Water District. The primary supplier of water to the region is the MWD. The MWD covers 5,130 square miles of the coastal plain in southern California, including 240 cities and unincorporated communities in Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura Counties. The MWD service area excludes certain portions of the SCAG region, i.e. Imperial County and most of San Bernardino County, and is

Table 6-1. Regional and Subregional Water Supply and Demand Projections in 1984 and Under the Proposed Project and Alternatives (2010)

	REGIONAL TOTAL (1984)	REGIONAL TOTAL (2010)	PLAIN SUBREGION (2010)	OUTLYING SUBREGION (2010)
Dependable Supplies (MAF per year)	7.48	6.72	2.60	4.12
Demand (MAF per year)				
Urban	3.03	3.98	3.07	0.91
Agriculture	4.02	3.94	0.23	3.71
Total	7.06	7.92	3.30	4.62
Projected Surplus (Shortfall) (MAF per year)	0.42	(1.20)	(0.70)	(0.50)
Projected Surplus (Shortfall) as Percentage of Total Demand	5.95	(15.15)	(21.2)	(10.8)

Source: Southern California Association of Governments (1987)

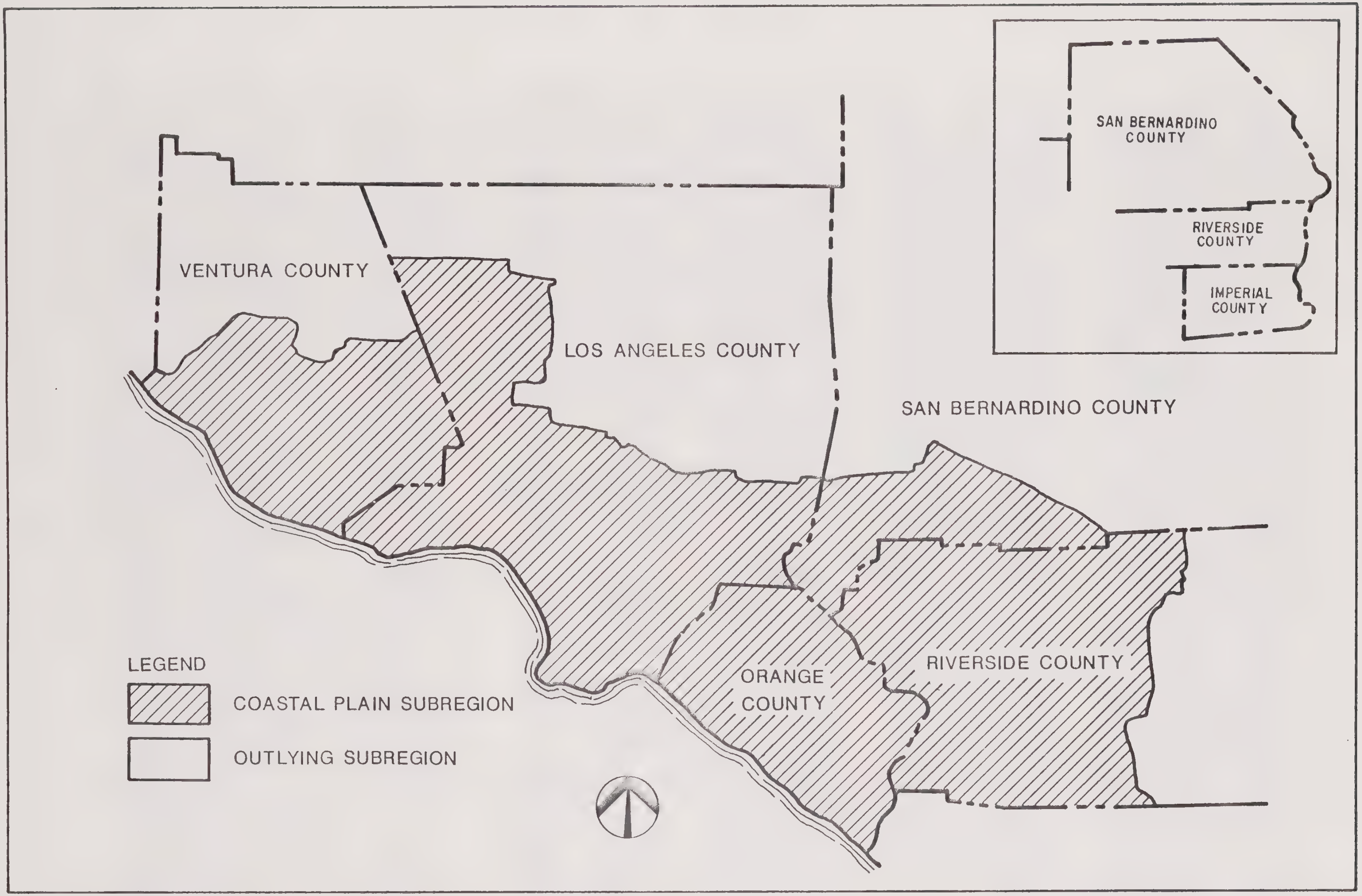


FIGURE 6-1. COASTAL PLAIN AND OUTLYING SUBREGIONS

generally contiguous with the coastal plain subregion as shown in Figure 6-1.

The population of the MWD service area has increased from 7.4 million in 1960 to more than 14 million in 1986, which represents approximately half of the state's population (State Water Contractors 1987a, Southern California Association of Governments 1987). The MWD sells water to 27 local districts, including the Los Angeles Department of Water and Power, 13 other cities, 12 municipal water districts, and one county water authority.

The MWD holds rights to approximately 3.37 MAF per year of dependable or firm supply, including 1.19 MAF from local sources, 1.14 MAF from the SWP, 0.47 MAF from the Colorado River, 0.42 MAF from the Los Angeles Aqueducts, and 0.15 from wastewater reuse (Chan pers. comm.). Firm or dependable yield is the annual supply expected to be available during periods of below-average precipitation, in accordance with a predetermined schedule or probability. Dependable supplies were estimated to exceed total average demand by 0.42 MAF (6 percent) in 1984, as indicated in Table 6-1.

Los Angeles Department of Water and Power. The City of Los Angeles Department of Water and Power (LADWP) is the second largest importer of water to the urbanized portion of the SCAG region. Although it is within the MWD service area and a member of the MWD, nearly 82 percent of the city's water demand in 1980-81 was met by the LADWP by importing supplies through the Los Angeles Aqueducts from the Owens Valley and Mono Basin, 12 percent was derived from local groundwater sources, and only 6 percent was provided by the MWD (Southern California Association of Governments 1982). The amount of water imported to the City of Los Angeles by the LADWP could be substantially reduced, pending the outcome of present and future litigation as discussed above.

Other Providers. Other major water providers include the Imperial Irrigation District, the Coachella Valley Water District, and the Palos Verdes Irrigation District.

Water Resource Alternatives. The MWD and other water providers are currently exploring various strategies for increasing water supplies and maximizing use of existing supplies. Imported supply options include storage of water from existing sources, use or storage of surplus water from other states or agricultural agencies, and predelivery of exchange water to irrigation districts.

The MWD has proposed storage of up to 3.0 MAF of surplus water in the Chino Basin (San Bernardino County), San Jacinto Basin (Riverside County), Main San Gabriel Basin (Los Angeles County), Raymond Basin (Los Angeles County), North Las Posas Basin (Ventura County), Coachella Valley Basin (Riverside County), and Arvin-Edison Basin (Kern County). The feasibility of this strategy, however, may be limited by the adverse effects of groundwater quality due to leaching of contaminants from the soil and disturbance of aquifers (Sienkiewich pers. comm.).

Reclaimed wastewater is the largest undeveloped local water resource available to offset future deficits in supply. Reclamation projects have been implemented in various areas within the region. The feasibility of increasing wastewater reclamation is limited by insufficient distribution capacity, cost, health concerns, and liability issues. The MWD provides financial support to local districts for wastewater reuse and groundwater treatment projects and is investigating methods of reducing and mitigating groundwater contamination (Sienkiewich pers. comm.).

Water Quality

The following analysis considers the quality of surface and groundwater sources that lie within the Santa Clara River Basin, Los Angeles River Basin, Santa Ana River Basin, and coastal and desert areas.

Santa Clara River Basin. The Santa Clara River Basin area is located in Ventura County and northern Los Angeles County and is drained by the Santa Clara River, which empties into the Pacific Ocean near Oxnard.

Surface water sources. Water from major reservoirs in the basin area is provided largely by the SWP and Los Angeles Aqueducts, and is generally of high quality. Tributary creeks generally possess good water quality except during low flows. Quality of the Santa Clara River is poorer and worsens in downstream sections when groundwaters rise, bringing high levels of total dissolved solids (TDS), irrigation return flows, and other contaminants.

Groundwater sources. Nine important groundwater basins are located in this area, with the Oxnard Plain Basin being the most important. Groundwater quality in the Oxnard Plain Basin has been deteriorating because of deep percolation of sewage, irrigation return flows, industrial wastes, and saltwater intrusion. Groundwater quality is generally good in the upper Santa Clara River Basin (Los Angeles County) but worsens near the Los Angeles County-Ventura County line. High TDS concentrations are common in the Santa Clara River Valley area.

Los Angeles River Basin

The Los Angeles River Basin area is located in southern Los Angeles County and is drained by the Los Angeles River, San Gabriel River, and Malibu Creek.

Surface water sources. The Los Angeles River system has minor water quality problems that are attributable to high pH, nitrate/nitrite, chlorine levels, and low dissolved oxygen. The Los Angeles River drainage includes large recreation and wildlife habitat areas in the San Fernando Valley. Minor water quality problems caused by urban runoff and point source discharges have occurred in urbanized portions of the San Gabriel River drainage system, but good water quality exists in the source areas of the San Gabriel Mountains. Malibu Creek and its tributaries are an intermittent stream system that drains a portion of the western Santa Monica Mountains. This drainage area has high TDS levels, and water quality has been reduced by wastewater discharge into the creek.

Groundwater sources. This area includes the Los Angeles Coastal Plain, San Fernando Valley, and San Gabriel Valley Basins. Water quality in the Los Angeles Coastal Plain Basin is generally good, although saltwater intrusion has been a problem along the coast. Quality is generally good in the San Fernando Valley Basin but the quality of water extracted by the City of Los Angeles has deteriorated due to overdrafting and intrusion of poorer quality groundwater. Localized problems brought about by high nitrate, toxics, and TDS levels have occurred in the San Gabriel Valley Basin, and a major Superfund groundwater decontamination project is in progress in this area.

Santa Ana River Basin

The Santa Ana River Basin area is located in Orange County and the western (nondesert) portions of San Bernardino and Riverside Counties.

Surface water sources. Improper operation of individual sewage storage or treatment systems in the upper Santa Ana River area has degraded stream water quality. High TDS and nutrient levels have reached lower portions of the river due to rising groundwater of low quality, urban runoff, and nonpoint agricultural pollution. Lakes in this area receive water from the SWP and Colorado River and have fair to good water quality.

Groundwater sources. Primary groundwater basins in this area include Orange County Coastal Plain, Upper Santa Ana River Valley, San Jacinto, Elsinore, and San Juan Creek. Groundwater quality is generally good in this area. Deterioration has occurred, however, due to recharge by Colorado River water, percolation of irrigation wastewater, overdrafting, seawater intrusion, and mineralization, and water quality was compromised further by municipal, industrial, and agricultural waste disposal. Groundwater problems have been alleviated by an increased use of Colorado River water by southern Orange County.

Marine Water

The coastal waters of the SCAG region consist of the southern portion of Santa Barbara Channel, Santa Monica Bay, and the San Pedro Channel, including San Pedro Bay.

The circulation of nearshore marine waters determines the extent to which pollutants are diluted and distributed. Nearshore water circulation patterns are determined by the major currents formed by the southeastward-flowing California current and its eddies, the onshore-offshore tidal currents (which are especially important in enclosed bays and estuaries), and the effects of wind and local topography.

Pollutants are introduced into the marine environment by point and nonpoint discharges. Point source discharges include effluents from municipal sewage treatment facilities, industrial wastewater discharges, and cooling water discharges (primarily from utility power plants). The most important source of nonpoint discharges is runoff from land, particularly urban storm runoff. Pollutants of greatest concern are heavy metals (e.g., zinc, copper, lead, cadmium, and mercury), nutrients such as nitrates and phosphates, and trace organic compounds such as halogenated hydrocarbons.

In general, offshore water subject to the diluting effects of major current systems has not been substantially degraded. In localized areas, however, with the weak current systems of some bays and estuaries, substantial degradation has occurred, and concerns are mounting over the adverse effects on ecosystems and public beaches in these areas.

Desert

The desert subregion includes most of San Bernardino County, eastern Riverside County, and Imperial County.

Surface water sources. Few water quality problems exist in this area with the exception of the Salton Sea vicinity, which has high and increasing salinity as a result of irrigation return flows, increasing salinity of Colorado River water, and inadequately treated municipal discharges (particularly from sources in Mexico).

Groundwater sources. Groundwater quality problems in the South Lahontan basin, located in desert portions of Los Angeles and San Bernardino Counties, include overdrafting and pollution from mining and sewage wastes. West Colorado River Basin water is mostly unusable, and the use of East Colorado River Basin water is limited as a result of increasingly high salinity near the Colorado River. Local groundwater supplies along the Colorado River are also poor where they are affected by saline river water, failing septic tanks and leachfield systems, and irrigation return flows.

Impacts and Mitigation Measures

Since the 2010 regional population is assumed to be the same under the proposed project and alternatives, and water demand is assumed to be proportional to population, effects of the various growth projections on water supply would be comparable at a regional level.

Proposed Project

Impact: Regional Water Supply Shortfall of 1.2 in 2010

Water supply and demand projections are shown in Table 6-1. Water demand in 2010 will be influenced by such factors as population growth, levels of agricultural production, land use patterns, water costs, and water conservation measures. It is assumed that urban per capita water consumption rates would decline by approximately 5 percent by 2010 as a result of water conservation measures and increased housing densities (Southern California Association of Governments 1987).

Water demand projections for urban and agricultural uses are based on "normal" weather conditions, although per capita use may vary significantly from year to year depending on rainfall and temperature levels. Estimates of dependable supply levels are based on "dry" periods, with higher levels expected in "normal" or "wet" years and lower levels expected in extremely "dry" or drought years. Such projections assume that both local and Los Angeles Aqueduct supplies remain stable but do not include additional yields

that may become available to the region (e.g., through cooperative water management programs with irrigation districts, the State, or the U. S. Bureau of Reclamation) because of their uncertainty. The potential effects that changes in water pricing would have on supply and demand are not considered in this analysis.

Substantial increases in urban water demand from population growth expected under the proposed project and smaller declines in agricultural water demand would increase regional water use by approximately 0.86 MAF (12.2 percent) between 1984 and 2010. Urban demand would increase by 0.95 MAF (31.7 percent) and agricultural demand would decrease by 0.08 MAF (2.0 percent). By 2010, agriculture and urban uses within the region would demand approximately the same amount of water. Approximately 58 percent of regional water demand in 2010 would come from the outlying subregion, based largely on agricultural water use (Southern California Association of Governments 1987).

DWR water demand projections for the MWD service area (including San Diego County and excluding Imperial County) indicate similar patterns among agricultural and urban land uses. Agricultural water use in this area is expected to decline by 0.24 MAF (17 percent), from 1.4 MAF in 1985 to 1.16 MAF in 2010, as irrigated acreage and water use per acre continue to fall. However, DWR has also projected that agricultural water demand in the San Diego Hydrologic Study Area will increase during the same period by 1.5 percent as the result of 4.6 percent growth in irrigated agricultural acreage within that area (State Water Contractors 1987a).

Urban water demand in the MWD service area is projected by DWR to increase 0.94 MAF (30.3 percent), from 3.10 MAF (1985) to 4.04 MAF (2010). Approximately half of this increase would be generated in Ventura, Los Angeles, and Orange Counties, with the balance generated in Riverside, San Bernardino, and San Diego Counties. The rate of increase would be highest in Riverside County (95 percent) and San Bernardino County (81 percent), and lowest in Los Angeles County (15 percent) and San Diego County (37 percent). Water demand by commercial and institutional uses is expected to grow at the greatest rate (49 percent) from 1985 to 2010, with residential demand increasing by 32 percent, industrial demand increasing by 20 percent, and demand from public and unaccounted uses increasing by 13 percent (State Water Contractors 1987a).

During this period, dependable supplies are expected to decline by 0.76 MAF (10.2 percent). These trends would result in a projected shortfall of 1.20 MAF in 2010, with supplies meeting less than 85 percent of total demand in that year. Lesser shortfalls would be expected in wet years and greater shortfalls would be expected in dry years.

The effects of increased water demand resulting from the proposed project would vary geographically within the region. The projected shortfall would be more severe in the coastal plain subregion, where dependable supplies total 2.60 MAF (78.8 percent of projected demand). Supplies would be expected to meet 89.2 percent of the demand in the outlying areas.

Cumulative projections by the MWD indicate an even more severe shortfall. The MWD forecasts a deficit of approximately 1.0 MAF in 2010

based on a 3.37 MAF supply that would meet 77.5 percent of estimated total demand (4.35 MAF) within the MWD service area (Chan pers. comm.).

Although total water demand levels would increase less rapidly than population growth under the proposed project, the increase is considered a significant impact as a result of projected shortfalls and the many constraints affecting both local and imported supplies.

This impact is considered significant but could be reduced to less than significant through implementation of the following measures, which are based on regional and statewide plans and projects (California Department of Water Resources 1987, Boronkay 1988).

Mitigation Measures

- The MWD and other water providers in the region should increase dependable annual supplies at a regional level by 2010 to at least 8.0 MAF and make the fullest use of existing resources by implementing the following measures as needed:

  - increase SWP yields through implementation of a Coordinated Operation Agreement between the State and the U. S. Bureau of Reclamation; completion of various Delta facility capacity improvements (including completion of Delta Pumping Plant, South Delta improvements, North Delta improvements, North Delta water management, and Delta levee improvements), offstream storage programs (including Kern Water Bank, Los Banos Grandes Reservoir, Kellogg/Los Vaqueros Reservoirs, and Delta island reservoir storage), CVP programs (including interim water supply acquisition and New Melones Reservoir conjunctive-use program), and other SWP programs (including Cachuma Reservoir enlargement); and implementation of water transfer agreements between agricultural and urban SWP contractors.

  - obtain maximum use of Colorado River supplies through implementation of various programs, including use of available surplus water from agricultural agencies and other states, Imperial County groundwater storage and recovery, Imperial County water conservation and surplus water diversion, Coachella Branch and All-American Canal lining projects, Palos Verdes Irrigation District water utilization, and Colorado River water banking;

  - store up to 3.0 MAF of surplus water in groundwater basins (e.g., Main San Gabriel Basin, Chino Basin, Coachella Basin, and San Jacinto Basin) as indicated above, provided that potential adverse effects on groundwater quality can be avoided or adequately mitigated; and

  - make optimum use of existing resources and minimize adverse effects of supply shortfalls by expanding and implementing other programs, including local wastewater reclamation, groundwater protection, groundwater treatment, water conservation,

surface water storage, and drought contingency planning projects.

Impact: Degradation of Surface Water, Groundwater, and Marine Water Quality

Certain surface water, groundwater, and marine water resources would be degraded by pollutants resulting from growth projected under the proposed project. The local extent and location of this degradation cannot be accurately determined without more specific information concerning the location of future development and pollutant discharges by source.

In general, population growth and associated development would increase quantities of point discharges by both industrial and municipal sources. These discharges would increase levels of dissolved and suspended solids, thermal effluents, nutrients, salts, toxic metals, and organic substances, depending on the effects of pollution control measures. The quality of wastewater discharges could also be adversely affected if shortfalls in wastewater treatment capacity occur as projected below (see "Wastewater Treatment" section below). Pollutants could result in increased turbidity and sedimentation, plankton blooms, reduced dissolved oxygen levels, and toxic effects to biota. Effects on marine waters from increased wastewater discharge levels would be most critical.

Projected growth would result in increased nonpoint surface water pollution due to increased runoff from urban and industrial lands and construction sites. Fallout of air pollutants could result in added acid and toxic metal pollution of surface waters.

Groundwater quality could be degraded by the infiltration of polluted surface waters, urban irrigation waters, leachates from failed septic and leachfield systems, and flows from solid and hazardous waste disposal sites. Development could also result in seawater intrusion and reduced groundwater quality from overdraft.

Adverse effects on marine water quality would result primarily from direct discharges of wastewaters to the marine environment and from the runoff of polluted water from the land surface. Additional effects could result from ocean vessel operations and aerial fallout, which is a major source of lead pollution. Effects of pollutants on bays and estuaries because of reduced water circulation, habitat requirements, and the recreational value of these areas. Increased use of secondary sewage treatment and mandatory reduction or elimination of sludge discharges could partially offset the effects of increased wastewater volumes but would have less effect on nonbiodegradable pollutants such as toxic metals and chlorinated hydrocarbons.

Adverse effects on surface water, groundwater, and marine water resources from population growth and urbanization represent a significant impact under the proposed project. This impact could be reduced to less than significant with implementation of the following measures.

Mitigation Measures

- o Local jurisdictions should link development phasing with phasing of new infrastructure, including adequate and effective drainage, wastewater, and waste disposal facilities.

- o Under direction of the U. S. Environmental Protection Agency, the State Water Resources Control Board, Regional Water Quality Control Boards, and local and regional agencies should administer National Pollutant Discharge Elimination System permits for point dischargers and implement comprehensive basin plans for groundwater protection and treatment.

- o Applicable jurisdictions and agencies should continue their influence and expand local coastal zone planning and management programs in conjunction with the State to prevent or reduce adverse effects on coastal water quality and to preserve or improve areas of special importance such as bays and estuaries.

- o Local jurisdictions should implement regional air quality mitigation measures to reduce or eliminate the potential adverse water quality effects of lead fallout and acid precipitation.

- o Local jurisdictions and water providers should mitigate groundwater quality problems (overdrafting, seawater intrusion, recharge effects) by improving groundwater basin management as recommended in Regional Water Quality Control Board groundwater basin plans using various methods, including: conjunctive use of surface water, groundwater, and reusable wastewater; appropriate use of artificial recharge; and controls on development in recharge areas.

- o Local jurisdictions should mitigate adverse effects of water pollution from nonpoint and other sources by implementing measures in SCAG's Areawide Waste Treatment Management Plan, including: implementing plans for containing and cleaning hazardous substance spills; strengthening and enforcing local management controls on construction site erosion and sediment control; implementing best management practices to control water pollution from agricultural areas; implementing improved streets, litter, catchbasin, inlet basins, and storm drain cleaning programs; and implementing measures to limit runoff and minimize peak flows from developing areas.

GMA-1

Impact: Regional Water Supply Shortfall of 1.2 MAF in 2010 and Degradation of Surface, Groundwater, and Marine Water Quality

Regional water supply shortfalls and water quality impacts that would result from growth under GMA-1 would be generally comparable to those described for the proposed project. These impacts are considered significant.

Within the coastal plain subregion, water supply and quality impacts under GMA-1 would be less extensive in certain areas of Ventura County and Los Angeles County (as well as marine waters in the vicinity of these areas) than those which would occur under the proposed project as a result of lower levels of projected population and employment growth. Other areas within the coastal plain subregion (e.g., Orange County) would experience more extensive impacts under GMA-1 as a result of higher levels of projected growth.

Expected water supply and quality impacts of GMA-1 in the outlying subregion would differ from those that would occur under the proposed project as a result of higher population growth levels and lower employment growth levels for Riverside, San Bernardino, and Imperial Counties. However, the nature and extent of these differences cannot be accurately determined based on available information.

These impacts could be reduced to less than significant with implementation of the following measures.

Mitigation Measures

o Same as those identified for the proposed project.

GMA-2

Regional water supply shortfalls and water quality effects that would result from growth under GMA-2 would be generally comparable to effects of the proposed project as discussed above. However, effects within certain areas of the coastal plain subregion (e.g., Orange County) would be more extensive than those which would occur under the proposed project as a result of higher levels of projected population and employment growth.

GMA-3

Regional water supply shortfalls and water quality effects that would result from growth under GMA-3 would be generally comparable to effects of the proposed project as discussed above. Effects within the coastal plain subregion (particularly Orange County) would be less extensive than those which would occur under the proposed project as a result of lower overall levels of projected population and employment growth. Effects within certain areas of the outlying subregion would be somewhat more extensive as a result of higher levels of projected population growth.

GMA-4

Regional water supply shortfalls and water quality effects that would result from growth under GMA-4 would be generally comparable to effects of the proposed project as discussed above. Effects within certain areas of the outlying subregion (e.g., Imperial County) would be somewhat more extensive as a result of higher levels of projected population and employment growth.

GMA-Low

The demand for public services would generally be less under GMA-Low than under the proposed project or GMA-1 because of the smaller population to be served. The level of demand for services that would occur under GMA-Low has not been quantified, and the relative effect of GMA-Low on public services would be comparable to those discussed for the proposed project and GMA-1.

GMA-High

The demand for public services would generally be greater under GMA-High than under the proposed project or GMA-1 because of the larger population to be served. The level of demand for services that would occur under GMA-High has not been quantified, and the relative effect of GMA-High on public services would be comparable to that discussed for the proposed project and GMA-1.

WASTEWATER TREATMENT

Setting

Nearly 90 percent of the regional population is served by 109 public- or municipally owned wastewater treatment plants, with the remaining 10 percent relying on privately operated septic tanks or small package treatment plants. Approximately 75 jurisdictions within the region provide wastewater collection, treatment, and disposal services (Southern California Association of Governments 1987).

The wastewater volume handled by all treatment plants in the region in 1985, 1,660.5 million gallons per day (MGD), represented 87 percent of the estimated collective capacity of those plants. Since peak flows exceed average daily wastewater flows (ADWF) by as much as 25 percent, plants operating at 75 percent capacity often are considered in need of expansion (Southern California Association of Governments 1987). In 1985, ADWF comprised 73 percent of countywide wastewater capacity in Riverside and San Bernardino Counties, 79 percent in Ventura and Imperial Counties, and 90 percent in Los Angeles and Orange Counties (Southern California Association of Governments 1987).

Some districts have ample treatment capacity, while other districts are approaching or exceeding their capacities, resulting in violations of state and federal waste discharge regulations. Table 6-2 identifies districts handling ADWFs in excess of 75 percent capacity. Some of these districts have plans to expand their wastewater treatment facilities, while districts not listed could also experience future shortfalls if they undergo very high levels of growth.

Table 6-2. Wastewater Districts with Average Flows Exceeding 75 Percent of Capacity, 1985

	Percent of Existing Capacity Used by Average Flows
VENTURA COUNTY	
Ojai Valley Sanitary District	87
City of Oxnard*	86
Saticoy Sanitary District	278
Simi Valley County Sanitation District*	92
City of Thousand Oaks (Hill Canyon Plant)*	90
Triunfo County Sanitation District*	89
Ventura County Waterworks District No. 1 (Moorpark)	93
LOS ANGELES COUNTY	
City of Avalon	134 (summer)
City of Los Angeles	
Hyperion	94
Los Angeles/Glendale Plant	100
County Sanitation Districts	
Joint Water Pollution Control Plant	94
San Jose Creek WRP	82
Whittier Narrows WRP	80
Pomona WRP	100
Los Coyotes WRP	93
Lancaster WRP*	124
Los Angeles County Public Works Department	
Lechuza Point Plant	83
Trancas Plant	83
Malibu Mesa Plant	100
ORANGE COUNTY	
Capistrano Beach Sanitary District*	86
County Sanitation Districts of Orange County*	98
Dana Point Sanitary District*	80
El Toro Water District	92
City of San Clemente*	85
City of San Juan Capistrano*	88
RIVERSIDE COUNTY	
City of Banning*	100+
City of Beaumont*	87
City of Blythe	85
City of Coachella*	83-100
City of Riverside	86
Coachella Valley Water District (Bombay Beach)	89
Eastern Municipal Water District	
Hemet-San Jacinto Plant	84
Sunnymead Plant	76
Edgemont Community Service District	100
Mecca Sanitary District	87
SAN BERNARDINO COUNTY	
Big Bear Area Regional Wastewater Agency*	78
Chino Basin Municipal Water District*	
Regional Plant No. 2 (Chino)*	94
Regional Plant No. 3 (Fontana)	100+
Helendale County Service Area	88
San Bernardino Valley Municipal Water District	
City of Redlands	78
City of San Bernardino	80-95
Victor Valley Wastewater Reclamation Authority	77

Table 6-2. Continued

	Percent of Existing Capacity Used by Average Flows
IMPERIAL COUNTY	
City of Brawley	96
City of Calipatria	100+
City of El Centro*	80
City of Holtville	77
Niland Sanitary District	88
Seeley County Water District*	89
City of Westmorland	125 (sewer hook-up moratorium in effect)

Source: Southern California Association of Governments 1987.

* Additional capacity is funded within these districts to partially or completely accommodate existing or anticipated shortfalls. Some districts without an asterisk have planned expansions which are not funded.

For example, annual sewage flows have reached 92 percent of the City of Los Angeles Hyperion Treatment System (HTS) plant's 480-MGD capacity and are expected to exceed its capacity before expansion of treatment facilities is completed in 1991 or 1992. In May 1988, the Los Angeles City Council adopted the Sewer Allocation Ordinance, which restricts the issuance of residential, commercial, and industrial building permits based on insufficient capacity of existing municipal waste treatment facilities. The City Council determined that uncontrolled increases in demand could result in pollution of Santa Monica Bay and damage to the HTS.

This interim ordinance will be in effect for up to 15 months and may be extended. It provides for review by the Los Angeles City Department of Public Works of all applications for nonexempt projects within the City of Los Angeles and other areas that would discharge sewage into the HTS. Building permit applications may be denied if the Department of Public Works determines that sufficient capacity is currently unavailable for that project. Applications that are denied for this reason will be placed on a waiting list and reconsidered in order of priority when surplus sewer treatment capacity becomes available.

Funding is the most critical issue facing current and future wastewater treatment capacity needs. In the past several years, drastic reductions in federal and state construction grant programs have caused increasing reliance on local funding sources (e.g., user fees, connection fees, special assessments, and bond sales) to finance necessary wastewater system improvements. Insufficient funding could retard or restrict development of impacted areas through growth moratoria on sewer connections or increases in housing costs resulting from higher local fees or levies that are assessed to finance improvements.

As more and more wastewater effluent is generated and enters receiving waters, the level of treatment becomes increasingly important for maintaining water quality. Three larger districts in Los Angeles and Orange Counties discharge into the Pacific Ocean and do not provide full secondary treatment, the minimum level of treatment required by law. The City of Los Angeles has agreed to provide full secondary treatment by 1998, at a cost of $2.5 billion, in response to state and federal enforcement actions (Southern California Association of Governments 1987).

Some districts, particularly in older areas, have deteriorating collection systems that need to be rehabilitated or replaced, even where treatment plant capacity is adequate. In 1985, 20 districts in all counties except Orange County needed to expand or rehabilitate portions of their collection systems (Southern California Association of Governments 1987).

Impacts and Mitigation Measures

Impacts of population growth on countywide wastewater treatment capacities under the proposed project and alternatives are summarized in Tables 6-3 and 6-4. Table 6-3 indicates ADWF projections in 2010, based on constant per capita flow rates. Table 6-3 provides estimates of the treatment plant capacity surplus or shortfall that would result in each county in 2010, based on existing and funded facilities as of 1985.

Table 6-3. 2010 Average Daily Wastewater Flow (ADWF) in Million Gallons Per Day (MGD), by County, Under the Proposed Project and Alternatives (a)

	VENTURA COUNTY	LOS ANGELES COUNTY	ORANGE COUNTY	RIVERSIDE COUNTY	SAN BERNARDINO COUNTY	IMPERIAL COUNTY	REGIONAL TOTAL
Proposed Project (GMA-4 Modified)	93.44	1,331.08	365.02	148.08	217.06	16.09	2,170.78
Alternatives							
GMA-1 (No Project)	92.87	1,294.35	373.34	161.29	220.93	18.37	2,161.15
GMA-2	92.87	1,320.96	385.68	146.31	208.84	18.37	2,173.03
GMA-3	92.87	1,304.21	346.53	167.20	227.74	18.69	2,157.23
GMA-4	95.57	1,322.67	364.27	152.33	213.26	20.24	2,168.35
GMA-Low	88.19	1,260.60	359.06	129.46	189.51	18.95	2,045.78
GMA-High	105.83	1,429.29	397.59	178.88	258.59	16.85	2,387.04

Notes: (a) Based on 1985 county per capita flows (from combined residential, industrial, and commercial flows), as shown below (Southern California Association of Governments 1987), and 2010 county population forecasts (Table 2-1). Assumes that per capita generation rates and amount of unsewered population would remain constant, with the exception of Los Angeles County (where it was assumed that 25 percent of the unsewered population would become sewered by 2010).

County	ADWF (Gallons Per Capita Per Day)
Ventura	102.1
Los Angeles	130.1
Orange	122.4
Riverside	81.9
San Bernardino	99.6
Imperial	114.8

Table 6-4. 2010 Daily Wastewater Treatment Capacity Surplus and Shortfalls in Million Gallons Per Day (MGD and as a Percentage of Capacity, by County, Under the Proposed Project and Alternatives (a)

		VENTURA COUNTY	LOS ANGELES COUNTY	ORANGE COUNTY	RIVERSIDE COUNTY	SAN BERNARDINO COUNTY	IMPERIAL COUNTY
Proposed Project (GMA-4 Modified)	MGD	3.6	-209.1	-17.0	-46.1	-73.1	-2.1
	%	3.7	-18.6	-4.9	-45.2	-50.7	-14.9
Alternatives							
GMA-1 (No Project)	MGD	4.1	-172.3	-25.3	-59.3	-76.9	-4.4
	%	4.3	-15.4	-7.3	-58.1	-53.4	-31.2
GMA-2	MGD	4.1	-199.0	-37.7	-44.3	-64.8	-4.4
	%	4.3	-17.7	-10.8	-43.4	-45.0	-31.2
GMA-3	MGD	4.1	-182.2	1.5	-65.2	-83.7	-4.7
	%	4.3	-16.2	0.4	-63.9	-58.2	-33.5
GMA-4	MGD	1.4	-200.7	-16.3	-50.3	-69.3	-6.2
	%	1.5	-17.9	-4.7	-49.3	-48.1	-44.6
GMA-Low	MGD	8.8	-138.6	-11.1	-27.5	-45.5	-5.0
	%	9.1	-12.4	-3.2	-26.9	-31.6	-35.4
GMA-High	MGD	-8.8	-307.3	-49.6	-76.9	-114.6	-2.9
	%	-9.1	-27.4	-14.2	-75.4	-79.6	-20.4

Notes: (a) Based on 2010 county population projections (Table 2-1); 2010 per capita ADWF by county (Table 6-3); and 2010 wastewater treatment capacity, including all existing plus funded capacity programmed for construction as of 1985 (Southern California Association of Governments 1987). Many districts have expansion plans that are unfunded; these have been excluded because of their uncertainty. Shortfalls are based on the difference between projected ADWF and capacity, but would be more severe than indicated since treatment plants must be sized to handle peak flows, which can be up to 25 percent higher than ADWF. Capacity figures listed also do not reflect type of treatment capability. If all plants complied with secondary treatment requirements per U. S. Environmental Protection Agency standards, shortfalls would be greatly increased since secondary treatment of a given amount of wastewater requires a substantially greater proportion of plant capacity than primary treatment of an equivalent volume of wastewater.

County	2010 Wastewater Treatment Capacity (MGD)
Ventura	97
Los Angeles	1,122
Orange	348
Riverside	102
San Bernardino	144
Imperial	14
Regional Total	1,827

Since analysis of future impacts in this section is aggregated at the county level, it considers demand and capacity collectively and does not indicate which individual districts would have surplus capacity or shortfalls. Table 6-3 shows that regional ADWF would increase by 709-725 MGD (48.9-50.0 percent) based on the growth projections in Table 2-1. The overall increase in wastewater volume would be lowest under GMA-3 and highest under GMA-2.

Table 6-4 shows that Los Angeles County would have the greatest absolute shortfalls and that all counties except Ventura and Orange Counties would have inadequate treatment plant capacity by 2010 under each of the growth alternatives. Shortfalls for Los Angeles County would be considerably higher if existing primary treatment capacity is converted to secondary treatment to the county's two largest plants (HTS and Joint Water Pollution Control).

San Bernardino and Riverside Counties would face the largest proportional shortfalls in capacity (45-64 percent), particularly under GMA-3. Los Angeles and Imperial Counties would experience less substantial shortfalls (15-45 percent), while shortfalls of up to 11 percent would occur in Orange County. These estimates are conservative, since shortfalls would actually be more severe than indicated due to peak daily and seasonal flows.

Proposed Project

Impact: Increased Daily Wastewater Treatment Demand to 2,170.8 Million Gallons. Projected 2010 ADWF would substantially exceed available treatment capacity in San Bernardino and Riverside Counties by 51 and 45 percent, respectively, while shortfalls of 19, 15, and 5 percent, respectively, would result in Los Angeles, Imperial, and Orange Counties. A 4-percent surplus would occur in Ventura County.

The wastewater treatment capacity shortfalls that would result from the proposed project represent a significant impact. This impact could be reduced to less than significant through implementation of the following measures.

Mitigation Measures

- The 1974 Areawide Waste Treatment Management Plan (208) should be updated to be consistent with the GMP and AQMP.

- To accommodate peak flows and to provide for a capacity reserve of approximately 10 percent, wastewater collection and treatment entities should upgrade their facilities as follows:

County	2010 Capacity	Percent Increase over Existing (1985) and Funded Capacity
Ventura	130 MGD	34
Los Angeles	1,850 MGD	65
Orange	510 MGD	47
Riverside	210 MGD	106
San Bernardino	300 MGD	108
Imperial	23 MGD	64

GMA-1

Impact: Increased Daily Wastewater Treatment Demand to 2,161.2 Million Gallons. Projected 2010 ADWF would exceed available treatment capacity in Riverside and San Bernardino Counties by 58 and 53 percent, respectively, while shortfalls of 31, 15, and 7 percent, respectively, would result in Imperial, Los Angeles, and Orange Counties. A 4-percent surplus would occur in Ventura County.

Compared to the proposed project, GMA-1 would increase the projected shortfalls in Imperial, Orange, Riverside, and San Bernardino Counties, by 109, 49, 29, and 5 percent, respectively. The projected Los Angeles County shortfall would decrease by 17 percent. Surplus capacity in Ventura County would increase by 16 percent.

The wastewater treatment capacity shortfalls that would result from this alternative represent a significant impact. This impact could be reduced to less than significant through implementation of the following measures.

Mitigation Measures

- The 1974 Areawide Waste Treatment Management Plan (208) should be updated to be consistent with the GMP and AQMP.
- To accommodate peak flows and to provide for a capacity reserve of approximately 10 percent, wastewater collection and treatment entities should upgrade their facilities as follows:

County	2010 Capacity	Percent Increase over Existing (1985) and Funded Capacity
Ventura	130 MGD	34
Los Angeles	1,800 MGD	60
Orange	520 MGD	49
Riverside	225 MGD	121
San Bernardino	310 MGD	115
Imperial	25 MGD	79

GMA-2

Projected 2010 ADWF would exceed available treatment capacity in San Bernardino and Riverside Counties by 45 and 43 percent, respectively, while shortfalls of 31 and 18 percent, respectively, would result in Imperial and Los Angeles Counties. Orange County would experience a shortfall of 11 percent, while Ventura County would have a 4-percent surplus.

Compared to the proposed project, GMA-2 would increase the projected shortfalls in Orange and Imperial Counties, respectively, by 120 and 109 percent. Projected San Bernardino, Los Angeles, and Riverside County shortfalls would decrease by 11, 5, and 4 percent, respectively. Surplus capacity in Ventura County would increase by 16 percent.

Compared to GMA-1, GMA-2 would increase the projected shortfalls in Orange and Los Angeles Counties by 48 and 15 percent, respectively. Projected Riverside and San Bernardino County shortfalls would decrease by 25 and 16 percent, respectively. An equivalent shortfall and surplus would occur in Imperial County and Ventura County, respectively.

GMA-3

Projected 2010 ADWF would exceed available treatment capacity in San Bernardino and Riverside Counties by 58 and 64 percent, respectively, while shortfalls of 34 and 16 percent would result in Imperial and Los Angeles Counties, respectively. Ventura and Orange Counties would experience a surplus of 4 and less than 1 percent, respectively.

Compared to the proposed project, shortfalls in Imperial, Riverside, and San Bernardino Counties would increase by 125, 41, and 15 percent, respectively. The shortfall in Los Angeles County would decrease by 13 percent, the surplus in Ventura County would increase by 16 percent, and a small surplus would result in Orange County rather than a 5-percent shortfall.

Compared to GMA-1, GMA-3 would increase the projected shortfalls in Riverside, San Bernardino, Imperial, and Los Angeles Counties by 10, 9, 7, and 5 percent, respectively. A small surplus would occur in Orange County rather than a 5-percent shortfall, and there would be an equivalent surplus in Ventura County.

GMA-4

Projected 2010 ADWF would exceed available treatment capacity in San Bernardino and Riverside Counties by 48 and 49 percent, respectively, while shortfalls of 45, 18, and 4 percent would result in Imperial, Los Angeles, and Orange Counties, respectively. A 4-percent surplus would occur in Ventura County.

Compared to the proposed project, shortfalls in Imperial and Riverside Counties would increase by 199 and 9 percent, respectively. Shortfalls in San Bernardino, Los Angeles, and Orange Counties would decrease by 5, 4,

and 4 percent, respectively. The surplus in Ventura County would decrease by 59 percent.

Compared to GMA-1, GMA-4 would increase the projected shortfalls in Imperial and Los Angeles Counties by 43 and 16 percent, respectively. Shortfalls in Orange, Riverside, and San Bernardino Counties would decrease by 29, 15, and 10 percent, respectively. The Ventura County surplus would decrease by 65 percent.

GMA-Low

Total regional ADWF generated in 2010 under GMA-Low would be 2,045 MGD, or 115-125 MGD (5.3-5.8 percent) less than levels forecast for the proposed project and GMA-1, respectively, as shown in Table 6-3. As compared to the proposed project and GMA-1, GMA-Low would result in greater excess treatment plant capacity in Ventura County and reduced capacity shortfalls in all other counties (except Imperial County), particularly in Riverside and San Bernardino Counties, as shown in Table 6-4.

GMA-High

Total regional ADWF generated in 2010 under GMA-High would be 2,387 MGD, or 216-226 MGD (10.0-10.5 percent) higher than levels forecast for the proposed project and GMA-1, respectively, as shown in Table 6-3. As compared to the proposed project, GMA-High would result in an unprecedented treatment plant capacity shortfall in Ventura County and increased shortfalls in all other counties, particularly in Riverside and San Bernardino Counties, as shown in Table 6-4. Shortfalls under GMA-1 are similar to those under GMA-High except that Imperial County has less of a shortfall under GMA-High than under GMA-1.

SOLID WASTE

Setting

Management of solid wastes is a challenge facing the SCAG region that will become greater with increased population and economic growth. Solid wastes consist of residential wastes (trash and garbage produced by households), construction wastes, commercial and industrial wastes, home appliances and abandoned vehicles, and sludge residues (waste remaining at the end of sewage treatment processes).

Approximately 95 percent of all solid waste generated in the region is disposed of in sanitary landfills, with disposals totaling approximately 20 million tons in 1984. Despite rising costs for land, equipment, labor, and environmental control systems, landfill disposal is the cheapest means of managing these wastes. Landfill disposal is the most utilized solid waste disposal technology in California and is expected to remain so for at least

the next decade or until alternatives gain much wider acceptance (Southern California Association of Governments 1987).

Landfill alternatives include reducing wastes at the generation source, recycling or composting waste materials, and burning waste for energy recovery. However, these alternatives are in only limited use in the region today because of cost, market uncertainties concerning the sale of recyclable materials, and air quality concerns associated with the production of energy from solid waste.

Although reliance on landfill disposal is expected to continue, the volume of solid wastes is increasing while landfill capacities are declining. Many landfills in the region have reached or are approaching capacity. The shortage of landfill capacity is most acute in urban areas, particularly in Los Angeles County and the valley area of San Bernardino County, where waste quantities are greatest and where suitable sites for new or expanded landfill sites are most difficult to find. Virtually all of Los Angeles County's permitted landfill capacity for residential and commercial waste could be depleted by the end of 1991 without increase in landfill capacity, according to a 1988 study by the Los Angeles County Sanitation Districts and the City and County of Los Angeles. The five landfills in the valley of San Bernardino County would be depleted by 1994 (Southern California Association of Governments 1988e).

Strong citizen opposition to continued use of landfills and development of new or expanded landfills exists in the highly urbanized areas of the region. This trend started in 1977, when the Los Angeles City Council rejected a permit extension sought by the Los Angeles County Sanitation Districts. This opposition has significantly reduced expected future regional landfill capacities by decreasing the life of existing landfills and blocking the siting of new facilities (Southern California Association of Governments 1988e). Largely because of this opposition, only one new landfill of significant size has been sited in the past 5 years. Most increases in capacity have been achieved by expanding existing landfills; however, total landfill capacity is still diminishing.

Impacts and Mitigation Measures

Regional annual solid waste disposal demand would increase from 19.94 million tons in 1984 to 29.36-29.50 million tons in 2010 (47.3-48.0 percent) under the proposed project and alternatives (Table 6-5). These estimates are based on constant per capita generation sites by county as reported for 1984. Other solid waste analyses have assumed 1.5 percent annual increases in per capita generation rates (Southern California Association of Governments 1988e).

Based on the population projections in Table 2-1 and 1984 CWMB data, landfill capacity remaining as of 1984 would be depleted in most counties before 2000 under the proposed project and alternatives (Table 6-6). Landfill capacity would be exhausted by 1989 in Ventura County, 1990 in San Bernardino County, 1995-1996 in Orange County, 1996 in Los Angeles County, 2004-2008 in Imperial County, and 2007-2009 in Riverside County.

Table 6-5. 2010 Solid Waste Disposal Demand (Thousand Tons), by County, Under the Proposed Project and Alternatives

	VENTURA COUNTY	LOS ANGELES COUNTY	ORANGE COUNTY	RIVERSIDE COUNTY	SAN BERNARDINO COUNTY	IMPERIAL COUNTY	REGIONAL TOTAL
Proposed Project (GMA-4 Modified)	1,117	17,802	5,070	2,893	2,463	123	29,468
Alternatives							
GMA-1 (No Project)	1,110	17,311	5,185	3,151	2,507	141	29,404
GMA-2	1,110	17,667	5,357	2,858	2,369	141	29,502
GMA-3	1,110	17,443	4,813	3,266	2,584	143	29,359
GMA-4	1,142	17,690	5,059	2,976	2,420	155	29,442
GMA-Low	1,054	16,860	4,987	2,529	2,150	145	27,725
GMA-High	1,265	19,116	5,522	3,495	2,934	129	32,461

Notes: (a) Based on county population projections (Table 2-1) and constant per capita solid waste disposal factors (Table 6-6).

Table 6-6. Projected Useful Life After 1984 (in Years) and Year of Saturation of Existing (1984) Landfill Capacity Under the Proposed Project and Alternatives (a)

	VENTURA COUNTY	LOS ANGELES COUNTY	ORANGE COUNTY	RIVERSIDE COUNTY	SAN BERNARDINO COUNTY	IMPERIAL COUNTY
Proposed Project (GMA-4 Modified)	4.54	11.54	10.50	22.34	5.54	21.25
	1989	1996	1995	2007	1990	2006
Alternatives						
GMA-1 (No Project)	4.54	11.62	10.45	22.18	5.57	20.15
	1989	1996	1995	2007	1990	2005
GMA-2	4.54	11.56	10.36	22.36	5.63	20.15
	1989	1996	1995	2007	1990	2005
GMA-3	4.54	11.59	10.65	22.12	5.54	20.11
	1989	1996	1995	2007	1990	2005
GMA-4	4.52	11.56	10.51	22.28	5.60	19.17
	1989	1996	1995	2007	1990	2004
GMA-Low	4.58	12.05	10.54	22.65	5.76	20.08
	1989	1997	1995	2007	1990	2005
GMA-High	4.44	11.35	10.32	22.02	5.40	21.11
	1989	1996	1995	2007	1990	2006

Notes: (a) Assumes straight-line population growth from 1984 to 2010, based on county population projections shown in Table 2-1, landfill capacity, and constant per capita waste disposal rates by county as reported by the California Waste Management Board (Southern California Association of Governments 1987).

County	Solid Waste Disposal (Tons per Year per Capita)	Remaining Landfill Capacity, 1984 (Thousand Tons)
Ventura	1.22	3,501
Los Angeles	1.74	174,900
Orange	1.70	42,175
Riverside	1.60	49,450
San Bernardino	1.13	7,794
Imperial	0.88	2,286

This regional analysis of landfill capacity is necessarily county based and is not landfill specific. Therefore, this analysis does not take into account some of the considerations that influence the amount of daily waste disposed of at a site, such as the size of the disposal area, disposal limitations enumerated in landfill operating permits, location of the landfills relative to waste-generators, and hauling costs. Implicit in this analysis is the assumption that landfill sites with capacity will be able to accept additional waste; in reality, this assumption may not be the case.

Proposed Project

Impact: Depletion of Existing Regional Landfill Capacity. In 2010, the regional quantity of solid waste disposed of in landfills would increase by 9.46 million tons (47.4 percent). Landfill capacity would be depleted by 1989 in Ventura County, by 1990 in San Bernardino County, by 1995 in Orange County, by 1996 in Los Angeles County, by 2008 Imperial County, and by 2008 in Riverside County.

The imminent depletion of existing landfill capacity is considered a significant impact. This impact could be reduced to a less-than-significant level with implementation of the measures indicated below.

Mitigation Measures

- A comprehensive regional solid waste management plan should be developed.
- The following counties, in their respective solid waste management plans, should require the following improvements, as identified by the CWMB (Southern California Association of Governments 1987):
  - Ventura County: complete the major expansion of an existing landfill and develop a new landfill;
  - Los Angeles County: expand existing landfills, develop new landfills, and implement resource recovery projects;
  - Orange County: expand two existing landfills and develop a new landfill;
  - Riverside County: expand one landfill and develop two new landfills.
  - San Bernardino: develop plans to expand one landfill; and
  - Imperial County: develop plans to expand landfills.

GMA-1

Impact: Depletion of Existing Regional Landfill Capacity. In 2010, the regional quantity of solid waste disposed of annually in landfills would in-

crease by 9.47 million tons (47.5 percent). Landfill capacity would be depleted by 1989 in Ventura County, by 1990 in San Bernardino County, by 1995 in Orange County, by 1996 in Los Angeles County, by 2008 in Imperial County, and by 2009 in Riverside County.

Compared to the proposed project, GMA-1 would shorten the useful life of landfill capacity in Orange, Riverside, and Imperial Counties. The most substantial differences would occur in Riverside and Imperial Counties, where the useful life of remaining landfill capacity would be shortened by nearly 1 year and 3 years, respectively.

The imminent depletion of existing landfill capacity is considered a significant impact, which could be reduced to less than significant with implementation of the measures identified below.

Mitigation Measures

o Same as those identified for the proposed project.

GMA-2

In 2010, the regional quantity of solid waste disposed of in landfills would increase by 9.57 million tons (48.0 percent). Landfill capacity would be depleted by 1989 in Ventura County, by 1990 in San Bernardino County, by 1995 in Orange County, by 1996 in Los Angeles County, by 2005 in Imperial County, and by 2009 in Riverside County.

Compared to the proposed project, GMA-2 would extend the useful life of existing landfill capacity in all counties except Orange County by as much as 3.5 months (Riverside County). The useful life of landfill capacity in Orange County would be shortened by approximately 3 months.

Compared to GMA-1, GMA-2 would extend the useful life of existing landfill capacity in Riverside County by approximately 14 months. The useful life of landfills in other counties would be comparable.

GMA-3

In 2010, the regional quantity of solid waste disposed of in landfills would increase by 9.42 million tons (47.3 percent). Landfill capacity would be depleted by 1989 in Ventura County, by 1990 in San Bernardino County, by 1996 in Orange County and Los Angeles County, by 2005 in Imperial County, and by 2007 in Riverside County.

Compared to the proposed project, GMA-3 would shorten the useful life of existing landfill capacity in Riverside County by approximately 15 months and that in Imperial County by approximately 3 years. The useful life of landfill capacity in other counties would be extended by as much as 2 months (Orange County).

Compared to GMA-1, GMA-3 would shorten the useful life of existing landfill capacity in Riverside County and Imperial County by approximately 5

months and 2 months, respectively, while extending that of Orange County by approximately 3 months. The useful life of landfill capacity in other counties would be comparable.

GMA-4

In 2010, the regional quantity of solid waste disposed of in landfills would increase by 9.51 million tons (47.7 percent). Landfill capacity would be depleted by 1989 in Ventura County, by 1990 in San Bernardino County, by 1995 in Orange County, by 1996 in Los Angeles County, by 2004 in Imperial County, and by 2009 in Riverside County.

Compared to the proposed project, GMA-4 would shorten the useful life of existing landfill capacity in Riverside County by more than 2 months and that in Imperial County by approximately 4 years. The useful life of landfill capacity in other counties would be extended by as much as 1 month (San Bernardino and Los Angeles Counties). The useful life of landfill capacity in other counties would be comparable.

Compared to GMA-1, GMA-4 would extend the useful life of existing landfill capacity in Riverside County by approximately 8 months and in Los Angeles County by approximately 1 month, while shortening that in Imperial County by approximately 10 months and in Orange County by approximately 1 month. The useful life of landfill capacity in other counties would be comparable.

GMA-Low

Total regional disposal demand generated in 2010 under GMA-Low would be 27.73 million tons, or 1.68-1.74 million tons (5.7-5.9 percent) less than levels forecast for the proposed project and GMA-1, respectively, as shown in Table 6-5. As compared to the proposed project and GMA-1, GMA-Low would extend the useful life of landfill capacity in all counties except Imperial County by as much as 6 months (as is the case in Los Angeles and Riverside Counties), as shown in Table 6-6.

GMA-High

Total regional disposal demand generated in 2010 under GMA-High would be 32.46 million tons or 29.29-29.93 tons (9.9-10.2 percent) more than levels forecast for the proposed project and GMA-1, respectively, as shown in Table 6-5. As compared to the proposed project, GMA-High would shorten the useful life of landfill capacity in all counties by as much as 4 months (as is the case in Riverside County), as shown in Table 6-6. Shortfalls under GMA-1 are similar to those under GMA-High except that Imperial County would have a greater useful life under GMA-High than under GMA-1.

HAZARDOUS WASTE

Setting

Nearly 1 million tons of hazardous wastes are generated each year for offsite disposal in the area encompassing the SCAG region and San Diego and Santa Barbara Counties (Southern California Hazardous Waste Management Authority 1988). These wastes are produced primarily by industry and are managed onsite or shipped offsite, untreated, to Class I land disposal facilities.

Disposal and Treatment Issues

Many environmental and public health problems associated with land, water, and air contamination have resulted from improper disposal, unsuitable disposal sites, or inadequate maintenance of such sites. Several sites have been closed because they either have reached capacity or do not meet new standards.

Because of site closures since the early 1980s, the only operating Class I landfill in the SCAG region is BKK in eastern Los Angeles County. Therefore, the SCAG region has become dependent on facilities outside the region: Casmalia in northern Santa Barbara County and Kettleman Hills in Kings County. The long-term viability of these two sites is questionable because of increasing pressure by concerned groups and individuals about landfilling of untreated wastes.

Land disposal costs are escalating rapidly, making land disposal less attractive economically. Related transportation costs are substantial because of required long-distance hauling. Rising disposal costs and remote site locations have encouraged illegal disposal in isolated areas, sewers, and storm drains.

Hazardous Waste Management Planning

Efforts are being made to clean up many inactive and abandoned sites under the federal and state Superfund programs. However, recent amendments to the federal Resource Conservation and Recovery Act mandate virtual elimination of land disposal by 1990 for most untreated liquid hazardous wastes. Similar deadlines recommended by the state mandate that landfills for hazardous waste disposal be phased out.

The approach now being aggressively pursued in the region is the minimization of future risks by treating hazardous wastes rather than simply disposing of them. Several treatment facilities operate in the region but there is a pressing need to increase the region's waste treatment capacity by siting new facilities.

The Southern California Hazardous Waste Management Authority (SCHWMA), a joint powers authority of local governments, was established to

assist in the siting of new landfill and treatment facilities. The SCHWMA has developed and adopted a regional draft waste management plan (Southern California Hazardous Waste Management Authority 1988) and a siting manual that includes facility siting criteria to assist in site selection. These criteria include protection of residents, surface water and groundwater quality, air quality, and environmentally sensitive areas; consistency with local social and economic development goals; facility structural stability; and safe transportation of wastes.

The draft regional hazardous waste management plan prepared by the SCHWMA (1988) recommends various policy actions, including:

- provide onsite treatment of contaminated soil whenever feasible;
- direct contaminated soil to other recycling facilities to decrease the regional need for incineration;
- amend the SCHWMA's 1985 siting criteria manual by adding requirements for a 2,000-foot buffer between all new facilities and residential areas (as adopted by San Bernardino and Orange Counties) and a minimum separation of 150 feet between all new facilities and groundwater sources;
- adopt the proposed "Fair Share Formula" and monitoring program through which SCHWMA members would be committed to solicit and consider proposals for new facilities based on existing capacity, capacity needs, and waste reduction progress;
- adopt the proposed policy that "all future hazardous waste projects must be consistent with the regional hazardous waste management plan";
- develop a regional waste reduction program that includes monitoring and specific coordination with military bases;
- develop a prototype intergovernmental agreement that includes alternatives for compensating siting jurisdictions, develop funding needed to provide such compensation, and develop a hazardous waste insurance program that could provide liability coverage for public agencies and private operators if feasible; and
- improve the process by which decisions are made on hazardous waste siting issues by adopting and implementing the Model Citizen Participation Program.

Impacts and Mitigation Measures

Proposed Project

Impact: Generation of 1.143-1.479 Million Tons of Offsite Hazardous Waste in 2010. Hazardous waste quantities are expected to increase as a result of future development in the region. Estimates of existing (1983) and

projected (2010) annual quantities of hazardous wastes disposed offsite are shown in Table 6-7. These estimates were derived by determining the approximate amounts of hazardous waste generated by various economic sectors and applying expected 1983-2010 employment growth rates by economic sector to these base levels.

The methodology used by SCAG in developing these estimates assumed that the increase in amount of waste generated by each sector would be proportional to employment growth in that sector and that the share of wastes sent offsite by sector and the rates of waste resource recovery by sector would remain constant. Hazardous waste quantities and practices will be affected by the state of the economy, government regulations and enforcement, manufacturing processes, and overall incentives for reductions or recycling of wastes.

The annual amount of offsite hazardous waste generated would be expected to increase by at least 16 percent from 1980 to 2010 based on economic growth alone. This estimate is conservative since most of the economic sectors that generate hazardous waste are expected to undergo low employment growth relative to regional employment growth. Increases in hazardous waste based on more generalized economic indicators have been estimated by other sources, including the Southern California Hazardous Waste Management Project (50-percent increase projected to 2000) and the Los Angeles County Solid Waste Management Plan (27-percent increase in Los Angeles County by 2005) (Southern California Association of Governments 1987).

Unless sufficient alternative methods of managing the wastes can be instituted, very serious regional environmental and economic repercussions could result. Environmental contamination would probably occur from illegal disposal brought on by lack of land disposal and treatment options. Many industries could leave the region because of the lack of adequate or available waste management facilities.

This impact is considered significant but could be reduced to less than significant with implementation of the measures identified below.

Mitigation Measures

- o The Southern California Hazardous Waste Management Authority should adopt and implement the 1989 Regional Hazardous Waste Management Plan.

- o Hazardous waste management entities should increase the annual regional hazardous waste management capacity to 1.5 million tons by 2010 (based on a 50-percent increase) by establishing new disposal and treatment facilities.

GMA-1

Impact: Generation of 1.143-1.479 Million Tons of Offsite Hazardous Waste in 2010. The increase in regional offsite hazardous waste generation and associated environmental effects that would result from growth under GMA-1 would be comparable to those described for the proposed project.

Table 6-7. Regional Quantity of Offsite Hazardous Waste Generated by Industry in 1983 and Under the Proposed Project and Alternatives (2010)

Industries Generating Hazardous Waste	1983 Generation (thousand tons/year)	Percent of Total	Projected Percentage Increase in Employment (1980-2010)	2010 Generation (thousand tons/year)
Oil and Gas Extraction	197	20	4.7	206
Chemicals and Allied Products	197	20	17.9	232
Petroleum and Coal Processing	296	30	-8.2	273
Fabricated Metal Products	49	5	18.4	58
Transportation Equipment	49	5	66.4	82
Electric, Gas, and Sanitary	49	5	13.4	56
Services	70	7	103.4	142
Miscellaneous (Agriculture, Construction, etc.)	79	8	19.5	94
Regional Total	986	100	15.9	1,143

Source: Southern California Association of Governments (1987)

This impact is considered significant but could be reduced to less than significant with implementation of the measures identified below.

Mitigation Measures

o Same as those identified for the proposed project.

GMA-2, GMA-3, and GMA-4

The increase in regional offsite hazardous waste generation and associated environmental effects that would result from growth under GMA-2, GMA-3, and GMA-4 would be comparable to those described for the proposed project.

GMA-Low

The demand for public services would generally be less under GMA-Low than under the proposed project or GMA-1 because of the smaller population to be served. The level of demand for services that would occur under GMA-Low has not been quantified, and the relative effect of GMA-Low on public services would be comparable to those discussed for the proposed project and GMA-1.

GMA-High

The demand for public services would generally be greater under GMA-High than under the proposed project or GMA-1 because of the larger population to be served. The level of demand for services that would occur under GMA-High has not been quantified, and the relative effect of GMA-High on public services would be comparable to that discussed for the proposed project and GMA-1.

SCHOOLS

Setting

Existing Shortage of Schools

A shortage of schools and school overcrowding exist in many areas of the SCAG region where substantial growth has occurred from high levels of immigration in central areas and rapid suburbanization in outlying areas. In 1986-87, for example, approximately 120 schools of the 618 schools in the Los Angeles Unified School District (LAUSD) were overcrowded and the district bused over 35,000 students from overcrowded schools to schools with surplus space. The LAUSD also operated 93 schools on a year-round schedule and considered extending year-round programs to an additional 80 schools.

School Costs and Financing

Recent estimates for Los Angeles place the cost of new schools at $10-12 million for each elementary school, $30 million for each junior high school, and $60 million for each senior high school. The LAUSD alone estimates the annual need for $1.0 billion for the next 5 years to build classrooms and enlarge existing campuses. The LAUSD and other districts in the region have submitted funding applications for new schools to the State Allocation Board. However, the state has not been able to provide adequate financing to these districts because of increased demand for state assistance and a shortage of available funds from state bond issues and other sources. Some districts have developed new financing mechanisms, including local assessment districts, to pay for new facilities.

School Impact Fees. Since January 1987, districts in the region have been authorized by AB 2926 to assess school impact fees on new residential and commercial or industrial development, provided that such development was shown to contribute to a need for construction of new facilities or reconstruction of existing facilities. Maximum fees were established initially at $1.50 per square foot on residential development and $0.25 on other development, and may be raised annually based on an inflation index. Some new development is exempt or subject to different fee levels under previous state legislation and existing development agreements. Fee revenues are to be used for necessary capital improvements and may be used to lease or acquire interim facilities such as portable classrooms to alleviate overcrowding.

Necessary and Sufficient Mitigation. AB 2926 stipulates that assessment of maximum allowable impact fees or an equivalent charge, or dedication or other requirement satisfies the legal requirement for mitigation of any "environmental effects related to the adequacy of school facilities when considering the approval of the establishment of conditions for the approval of a development project" under CEQA. This provision appears to preclude implementation of any mitigation measures under CEQA that, singly or jointly, would exceed in value the total of maximum applicable impact fees. Because of this statutory limitation, authorized fee assessments or equivalent mitigation measures may not in fact reduce identified school impacts to a less-than-significant level. Additional mitigation measures may, however, be applied under project review standards or procedures that are independent of the CEQA process.

Student Composition and Performance

In 1980, approximately half of all school-age children in the SCAG region were reported as Non-Hispanic White. Hispanic, Asian/Other, and Black children represented 32, 11, and 7 percent of the school-age population. Approximately 155,000 children in the region that year were immigrants and had been in the United States for 5 years or less, representing approximately 6.5 percent of all school-age children. Most of these children and other American-born children from immigrant families cannot speak, or are not fluent in, English. More than 80 different languages or dialects are represented in the LAUSD alone, and there is a shortage of qualified teachers who speak many of these languages.

Since the 1960s, the academic performance of California students in grades K-12 has declined markedly, with minority and lower income students having substantially lower achievement levels and retention rates than other students. According to a United Way report, this difference has been attributed to various factors, including language and cultural barriers among immigrant youth, overcrowded and underfunded schools, ineffective programs, and inexperienced staff (Southern California Association of Governments 1987).

As discussed in Chapter 4 of this report, the region is moving from a manufacturing-based economy to a service-based economy that requires higher levels of education and training. Both the education and business communities view continued educational improvements as vital to preparing today's and tomorrow's youth for a changing economy. Unless these improvements can be made for all students, particularly the growing disadvantaged minority population, a 1985 study by the Southern California Research Council on Financing Quality Education indicated that there will be not only large economic costs, but also large social costs (e.g., a less skilled work force, lower productivity, increased social services costs, and potentially more crime) (Southern California Association of Governments 1987).

Impacts and Mitigation Measures

Proposed Project

Impact: Demand for 677 Additional Schools and 31,100 Additional Teachers. Population growth projected under the proposed project would require a substantial increase in the facilities and staff provided by local school districts. The regional school-age population (ages 5-17) would increase by 870,000 (37 percent), from 2.36 million in 1980 to 3.23 million in 2010, as shown in Table 6-8. The school-age population is expected to grow at a slower rate than overall population growth during this period because of the general aging of the population as discussed in Chapter 4. This increase in school-age population by 2010 would require an increase of 582 elementary and junior high schools and 95 senior high schools. An additional 31,100 teachers would be needed to staff these schools (Southern California Association of Governments 1987).

School enrollment and needs projections are based on certain assumptions. It is assumed that the percentage of school-age children currently enrolled in all schools (94 percent) and the current percentage of these students enrolled in public schools (87 percent) would remain constant, that new schools would be required for 90 percent of additional public school enrollment, and that the average existing teacher-to-student ratios for all classrooms (1:23) would also remain constant. It is also assumed that elementary and junior high schools would have a capacity of 800 students and senior high schools a capacity of 1,900. The estimate of needed teachers is based on additional students and does not include replacement of teachers who will retire by 2010 (Southern California Association of Governments 1987).

Table 6-8. Regional School-Age Population by Ethnicity in 1980 and Under the Proposed Project and Alternatives (2010)

	Number of School-Age Children		Percentage of All School-Age Children		
Ethnicity	1980	2010	1980	2010	Percentage Change, 1980-2010
Hispanic	757,064	1,643,051	32.1	50.9	+117.0
NonHispanic White	1,189,241	948,506	50.4	29.4	-20.2
Black	258,232	355,597	10.9	11.0	+37.7
Asian/Other	155,283	279,467	6.6	8.7	+80.0
Total	2,359,820	3,226,620	100.0	100.0	+36.7

Source: Southern California Association of Governments (1987)

Increasing ethnic and cultural diversity would accompany enrollment growth in the region. By 2010, Hispanic children would constitute more than half (51 percent) of the school-age population in the region and Non-Hispanic White children would represent less than 30 percent. The number of Hispanic school-age children between 1980 and 2010 would more than double, while the number of Asian/Other children would nearly double and the number of Black children would increase by nearly 50 percent. The Non-Hispanic White school-age population is expected to decline by more than 20 percent during this period. There would be a continuing and substantial demand for special language and education programs because of high levels of immigration to the region and the diversity of student backgrounds and needs.

Because of the magnitude and nature of these changes, the rate at which they are expected to occur, and financing constraints, this impact is considered significant but could be reduced to less than significant with implementation of the measures identified below.

Mitigation Measures

- Local school districts should implement the following measures as needed:

  - increase transportation of students from overcrowded schools to schools with surplus space;

  - increase the capacity of all existing facilities through extended (e.g., year-round) schedules or other means;

  - build at least 677 new schools by 2010, including 582 elementary and junior high schools and 95 senior high schools;

  - assess maximum allowable school impact fees as authorized by AB 2926 and use fee revenues to provide interim and permanent facilities;

  - if fee revenues and state funding are not sufficient to acquire school sites and provide new facilities, establish alternative financing mechanisms such as community facilities districts to generate needed revenues or negotiate agreements that provide for site dedication and/or school construction by private parties;

  - hire additional qualified administrative, teaching, and support staff, including at least 31,100 new teachers; and

  - provide educational programs that meet the educational needs of all students, particularly those whose English speaking ability is limited or who are otherwise disadvantaged.

GMA-1

Impact: Demand for 677 Additional School Facilities and 31,100 Additional Teachers. The increase in regional enrollment, facilities, and staffing, and challenges associated with a diverse student population that would occur under GMA-1 would be comparable to those described for the proposed project. This impact is considered significant but could be reduced to less than significant with implementation of the measures identified below.

Mitigation Measures

o Same as those identified for the proposed project.

GMA-2, GMA-3, and GMA-4

Regional effects on local schools that would result from growth under GMA-2, GMA-3, and GMA-4 would be comparable to those of the proposed project as discussed above.

GMA-Low

The demand for public services would generally be less under GMA-Low than under the proposed project or GMA-1 because of the smaller population to be served. The level of demand for services that would occur under GMA-Low has not been quantified, and the relative effect of GMA-Low on public services would be comparable to those discussed for the proposed project and GMA-1.

GMA-High

The demand for public services would generally be greater under GMA-High than under the proposed project or GMA-1 because of the larger population to be served. The level of demand for services that would occur under GMA-High has not been quantified, and the relative effect of GMA-High on public services would be comparable to that discussed for the proposed project and GMA-1.

LAW ENFORCEMENT

Setting

Service Providers

In all counties of the SCAG region, county sheriff departments provide police protection to unincorporated areas. Cities provide their own police protection, although in some cases individual cities contract with the county sheriff department or with a nearby larger city for police services.

The California Highway Patrol provides law enforcement services on state and interstate highways. It also provides back-up services, along with county sheriff departments, on federal lands such as national forests and Bureau of Land Management land. State rangers police state park and recreation areas.

Crime Rates and Patterns

Crime statistics by county for 1984 are shown in Table 6-9. Los Angeles County had the highest crime rate, (4,150 reported crimes per 100,000 population). Although Orange County is second in population and density only to Los Angeles, its crime rate was much lower than those of San Bernardino, Riverside, and Imperial Counties. Ventura County also had a relatively low crime rate.

The greatest differences between counties regard the incidence of violent crime. Los Angeles County's rate of violent crime was far higher than those of other counties. Imperial County, which has the least population of all six counties, had the highest property crime rate. Although more heavily populated areas generally seem to have higher crime rates, demographic and socioeconomic factors also influence the crime rate.

Males in the 15-29 age group are responsible for a disproportionately large share of violent and property crimes committed in the SCAG region. They constitute less than 15 percent of the population but are involved in 61 and 65 percent of all arrests for violent and property crimes, respectively, within the region.

Another important aspect of regional crime patterns is youth gangs. The Los Angeles area has a high and increasing incidence of gang activity. Gangs are active among all major ethnic groups and socioeconomic levels but are most prevalent in lower income neighborhoods. Gang-related crime is closely related to drug trafficking and "turf" conflicts. Factors contributing to gang activity and crime include high school drop-out and unemployment rates and ethnic tensions.

Police Personnel and Costs

In 1984, the SCAG region had 24,172 sworn officers and sheriffs, for a ratio of 1.95 police officers/sheriffs per 1,000 population. There is a perceived shortage of law enforcement personnel, and the region has a backlogged court system and overcrowded correctional facilities. Overcrowded conditions in local jails have been compounded by the trend toward increased lengths and rates of incarceration and the number of persons who are unable to make bail and must wait in jail pending trials or preliminary hearings (Southern California Association of Governments 1987).

Total criminal justice expenditures for the SCAG region in 1984 were \$2.5 billion. These included personnel and facility costs for law enforcement, courts, court-related functions, corrections, prosecution, and public defense. Since 1975, costs for law enforcement have consistently comprised at least two-thirds of all criminal justice costs. Expenditures have increased

Table 6-9. 1984 Population Density and Crime Rates by County

County	Density (Persons Per Urban Acre)	Violent Crimes Per One Thousand Population (a)	Property Crimes Per One Thousand Population (b)	Crime Index Per One Thousand Population (c)
Los Angeles	12.7	1,200	2,950	4,150
Orange	11.1	430	2,140	2,570
San Bernardino	7.3	730	2,530	3,260
Riverside	5.6	630	2,790	3,420
Ventura	8.3	320	1,620	1,940
Imperial	6.3	620	3,020	3,640

Source: Southern California Association of Governments 1987

Notes: (a) Violent crimes are crimes against a person, including homicide, nonvehicular manslaughter, rape, robbery, and assault.

(b) Property crimes consist of burglary and motor-vehicle theft.

(c) The California Crime Index, which is often used to express the crime rate, includes select violent and property crimes reported per 1,000 population. These crimes elicit the most attention and concern among the public, possibly due to sensationalism and fear. "White Collar" crime is not accounted for in this index, although such crime (e.g., fraud) affects businesses, jobs, and public confidence.

at a faster rate than population as a result of inflation, new equipment and facilities, the growth of specialized law enforcement units (e.g., drug enforcement), and increased sentencing.

Impacts and Mitigation Measures

Proposed Project

Impact: Need for at Least 11,430 Additional Police Officers and Sheriffs and Additional Facilities (Above 1984 Levels)

To maintain the existing average regional staff-to-population ratio of 1.95 under the proposed project, 11,430 additional police offers and sheriffs would be needed by 2010, representing a 47-percent increase in personnel and bring the total number of officers and sheriffs in the region to more than 35,000. Police-related considerations include the need for a more racially diverse and multilingual police force (Southern California Association of Governments 1987).

Police service demand levels in individual jurisdictions are determined primarily by the mix of land uses, per capita property values, per capita crimes against individuals and property, unemployment levels, and the specific characteristics of an area. In residential areas the greatest demand is for traffic control, and there are relatively few service calls. In industrial areas the highest demand is for surveillance. High population densities, vacancy rates, transiency, incidence of isolated urban land uses, and unemployment generally increase the need for police.

With increasing population density in many areas of the region, congested conditions could reduce response times. To maintain existing response times, it may be necessary to increase the ratio of police officers/sheriffs per 1,000 population above existing levels in more densely populated areas. Some of the increased need for public law enforcement personnel could be reduced by the current trend toward privatization (contracting) of law enforcement services in many areas of the region and increasing use of advanced security and crime deterrence technology.

These projections assume that crime rates in 2010 are similar to those in 1984 on a regional basis. Per capita crime rates in the region could actually decrease since the proportion of the population in the male 15-29 age group is expected to decline from 14.3 to 11.0 percent. Absolute numbers of persons in this age group and crimes within the region would increase, but at a slower rate than that of the population.

Economic projections under the proposed project indicate a growing economy that could offer many future job opportunities, reduce unemployment, and reduce the overall crime rate in the region. However, the expected rapid growth of jobs does not necessarily indicate increased job opportunities for poor youth since a large share of these jobs would require advanced education and skill levels. Fewer or more limited opportunities for economic advancement could lead to increased crime.

In addition to increased law enforcement personnel, a substantial increase in law enforcement facilities and equipment would be needed. Municipal and superior court systems would need to be expanded, and there would be increased needs for judges, commissioners, grand juries, and other auxiliary workers. The need for additional correctional facilities may be partially offset by increased use of alternatives to incarceration for certain offenders, such as community work programs.

Because of the magnitude of projected need for increased personnel and facilities and the costs of law enforcement, this impact is considered significant. The following mitigation measures would be required to reduce this impact to a less-than-significant level.

Mitigation Measures

- Law enforcement entities should provide needed police personnel, facilities, and equipment, as required by new development, by implementing the following measures as needed:

  - implement programs to reduce the crime rate, including drug and gang prevention programs and education, job training, and community activities for youth and young adults;

  - place greater reliance on developers to provide needed services and facilities;

  - achieve better efficiency in the delivery of police protection services and use of facilities through consolidation of services, better use of underutilized facilities, and redefinition of service district boundaries to achieve better efficiencies of scale;

  - use new technologies and policies that increase system efficiencies and reduce demands;

  - require that services be contracted to the private sector, such as private surveillance, in those instances where they can be provided more efficiently and at less cost;

  - promote greater responsibility for nongovernmental provision of certain services or facilities at the neighborhood or homeowner association level; and

  - require that development be phased according to the availability of adequate public services and facilities.

GMA-1

Impact: Need for at Least 11,430 Additional Police Officers and Sheriffs and Additional Facilities. The increases in regional law enforcement personnel and facilities that would be required to provide services under GMA-1 would be comparable to those described above for the proposed project. This impact is considered significant. The following mitigation

measures would be required to reduce this impact to a less-than-significant level.

Mitigation Measures

o Same as those identified for the proposed project.

GMA-2, GMA-3, and GMA-4

Effects on law enforcement resources at a regional level that would result under GMA-2, GMA-3, and GMA-4 would be comparable to those described above for the proposed project.

GMA-Low

The demand for public services would generally be less under GMA-Low than under the proposed project or GMA-1 because of the smaller population to be served. The level of demand for services that would occur under GMA-Low has not been quantified, and the relative effect of GMA-Low on public services would be comparable to those discussed for the proposed project and GMA-1.

GMA-High

The demand for public services would generally be greater under GMA-High than under the proposed project or GMA-1 because of the larger population to be served. The level of demand for services that would occur under GMA-High has not been quantified, and the relative effect of GMA-High on public services would be comparable to that discussed for the proposed project and GMA-1.

FIRE PROTECTION

Setting

Existing Services and Conditions

Fire protection consists of building and fire code inspection, fire detection, firefighting, and paramedical care. These services are generally provided by city and county fire departments. Some cities contract with their respective county fire departments for fire protection. Special districts in Riverside and San Bernardino Counties serve unincorporated and some incorporated areas.

The U. S. Forest Service provides fire protection on all national forest lands within the SCAG region. The California Department of Forestry has jurisdiction over wildland fire protection in various unincorporated areas of

Imperial, Riverside, and San Bernardino Counties. Northern and eastern desert areas of San Bernardino County are served by the Bureau of Land Management and various fire protection districts. The northeastern area of Los Angeles County is served by the Los Angeles County Department of Forestry.

Each city and unincorporated area in California has a fire rating or fire insurance code that indicates the area's level of risk for the purpose of fire insurance underwriting. Industrial areas and high-intensity land uses usually require a high level of protection. Many undeveloped areas of the region also carry high fire risks due to dry climate and the presence of vegetation.

Approximately 12,400 personnel (1.07 employees per 1,000 population) were employed in fire protection within the region in 1977 (Southern California Association of Governments 1982).

Impacts and Mitigation Measures

Proposed Project

Impact: Need for at Least 7,100-10,970 Additional Fire Protection Personnel by 2010 (Above 1977 Staffing) and Additional Facilities. To maintain the 1977 average regional staff-to-population ratio of 1.07 under the proposed project, the number of fire protection personnel would need to be increased by approximately 7,100 (58 percent) above the 1977 level by 2010. This increase would bring the total number of employees providing fire protection in the region to more than 19,500 (Southern California Association of Governments 1982).

A 1980 study of eight California cities (Economic Research Associates 1985) indicates that 1.28 full-time fire personnel per 1,000 population are employed by fire departments serving jurisdictions of 10,000-90,000 people. Based on this ratio, approximately 23,370 fire protection employees (or 10,970 employees more than the 1977 level) would be needed in the SCAG region by 2010.

This projection provides a useful approximation of fire personnel needs. However, it does not account for a number of factors influencing fire protection needs that could vary depending on the location, type, and density of future growth.

Additional fire stations and equipment would also be needed, but the extent of these needs would depend on various factors, including the location and density of future growth, building heights and construction types, traffic access and required response times, availability of water, fire suppression and control technologies, levels of service demanded, and service efficiencies. If these factors were considered, projected regional personnel needs could be different.

Because of the magnitude of the projected increase in personnel, this impact is considered significant. The following mitigation measures would be required to reduce this impact to a less-than-significant level.

Mitigation Measures

- o Fire protection entities should provide needed fire personnel, facilities, and equipment, as required by new development, by implementing the following measures as needed:

  - reduce fire protection demands and costs by requiring adequate emergency access, applying land use restrictions in high-risk areas and performance standards on high-risk activities, and incorporating standard fire prevention features into new development (such as automatic sprinklers);

  - implement fire safety education programs;

  - provide specialized training for fire personnel as needed

  - achieve better efficiency in the delivery of fire protection services and use of facilities through consolidation of services, better use of underutilized facilities, and redefinition of service district boundaries to achieve better efficiencies of scale;

  - use new technologies and policies that increase system efficiencies and reduce demands;

  - promote greater responsibility for nongovernmental provision of certain services or facilities at the neighborhood or homeowner association level; and

  - require that development be phased according to the availability of adequate public services and facilities.

GMA-1

Impact: Need for at Least 7,100-10,970 Additional Fire Protection Personnel by 2010 (Above 1977 Staffing) and Additional Facilities. The increases in regional fire protection personnel and facilities that would be required to provide services under GMA-1 would be comparable to those described above for the proposed project. This impact is considered significant. The following mitigation measures would be required to reduce this impact to a less-than-significant level.

Mitigation Measures

- o Same as those identified for the proposed project.

GMA-2, GMA-3, and GMA-4

Effects on fire enforcement resources at a regional level that would result under GMA-2, GMA-3, and GMA-4 would be comparable to those described above for the proposed project.

GMA-Low

The demand for public services would generally be less under GMA-Low than under the proposed project or GMA-1 because of the smaller population to be served. The level of demand for services that would occur under GMA-Low has not been quantified, and the relative effect of GMA-Low on public services would be comparable to those discussed for the proposed project and GMA-1.

GMA-High

The demand for public services would generally be greater under GMA-High than under the proposed project or GMA-1 because of the larger population to be served. The level of demand for services that would occur under GMA-High has not been quantified, and the relative effect of GMA-High on public services would be comparable to that discussed for the proposed project and GMA-1.

HEALTH CARE AND SOCIAL SERVICES

Setting

Some health care and social services are provided by government programs, but many are provided by the region's private social service organizations, many of which are nonprofit. Recent cutbacks in government programs have resulted in an increasing share of services being provided by the private sector. Some private organizations deliver services for publicly funded programs under contract or through purchase of service agreements.

Health Care Services

Facilities and programs. Health care in the region is provided by a complex network of public and private health care facilities, offering a wide variety of services for all ages and income groups. The health care system includes general acute care hospitals, acute psychiatric hospitals, chemical dependency recovery hospitals, skilled nursing facilities, intermediate care facilities, community clinics, and private physical care. Services are available to residents through various programs. These include direct payment for service by recipients as well as health insurance reimbursements offered by private insurance companies and programs such as Medicare and MediCal.

Acute care facilities are receiving considerable competition from health maintenance organizations (HMOs) in serving the overall population. HMOs offer a wide range of medical services for a prepaid membership fee, reduce costs by requiring a single combined fee rather than payment for individual services, and are thought by many to provide more comprehensive and affordable health care on a continuous basis.

Skilled nursing facilities (SNF) provide 24-hour nursing care and rehabilitation to patients who are extremely ill, but no longer require hospitalization. The 540 SNFs in the region provide a total of 54,061 licensed skilled nursing beds and are operating at an occupancy rate of 92-94 percent.

Many elderly rely heavily on nursing homes offering custodial care on a permanent basis. However, increased attention has been given to alternatives to nursing homes that are potentially less costly and more beneficial for the elderly population needing long-term custodial care. Emerging services include homemaker assistance, adult day care centers, home health care, and friendly visiting. Presently, 200 home health care agencies exist in the SCAG region. However, many of these programs have limited resources and are not eligible for full private insurance reimbursement, which limits both the scope and quality of the services they can provide and the affordability of these services to those in need.

<u>Occupancy levels</u>. There is a relative imbalance in demand for specific services; e.g., skilled nursing facilities are operating at very high occupancy levels while some general acute care hospitals are facing possible closure due to low occupancy rates.

<u>Service trends and issues</u>. As a group, the elderly use health care services at three times the rate of the general population because of their higher incidence of acute, chronic, and disabling diseases. The elderly require relatively high rates of physician care, hospitalization, and long-term nursing or custodial care, particularly those in the age group of 75 and over.

<u>Constraints to providing adequate care</u>. Health care costs and shortages of skilled personnel are the major barriers to providing necessary levels of care. Costs to both users and providers have increased dramatically despite efforts by public and private sector sponsors to maintain reasonable rates. Many elderly persons are forced to liquidate their assets, use their life savings, or refrain from using needed services because of high costs.

This problem is particularly difficult for the elderly poor, who must generally rely on free or low cost health care provided by MediCal and/or county programs. In Los Angeles County alone, 14 percent of the population and 9 percent of the population 65 and above lives below the poverty level. Approximately 70 percent of the poor are ethnic minorities.

Meeting the costs of health care is also a problem for the younger and working poor who often do not not receive health insurance as an employment benefit and cannot afford private insurance. An estimated 20 percent of the population in California is not covered by any kind of health

insurance, and extended health care costs can be catastophic. Many are underinsured, notably the elderly who cannot afford the supplemental private insurance usually needed to augment Medicare but are not eligible for MediCal.

A substantial and growing shortage of skilled nursing staff exists; in Los Angeles County hospitals alone, there is a 20-percent shortage of nurses. Many facilities that offer health care to the poor are overburdened and cannot provide needed services. The number of private physicians who will accept MediCal patients has declined, placing added burdens on already overcrowded public facilities. Both MediCal and county health programs have reduced services because of budget constraints, forcing many of the poor to forego necessary health care (including routine or preventive care).

Limited access to health care services and multilingual health care professionals by non-English-speaking residents is also a growing concern. According to the 1980 Census, 9 percent of Los Angeles County residents did not speak English, and the vast majority of non-English-speaking persons (84 percent) were adults.

Infant mortality. Infant mortality rates remain very high among the Black population in Los Angeles County (18.8 deaths per 1,000 live births). The comparable rates are 12.3, 7.8, and 5.1, respectively, for Non-Hispanic Whites, Hispanics, and Asians.

Public Assistance Programs

Public assistance programs provide income support or other financial assistance to the poor. These include major state and federally sponsored programs such as Aid to Families with Dependent Children (AFDC); food stamps; the Supplemental Security Income/State Supplementary Program (SSI/SSP) for the elderly, blind, and disabled; and MediCal. Counties also provide various forms of relief and assistance to the needy, including General Relief (available to certain indigents not eligible for federal and state assistance). Counties also help administer state and federal programs such as AFDC and food stamps. Qualifying U. S. citizens, legal immigrants, and refugees are generally eligible for these programs. Amnesty provisions of the recently enacted national immigration reform program allow undocumented immigrants who have been in the U. S. since prior to 1982 to become eligible for state and federal programs for which they are currently ineligible. Such programs include AFDC, food stamps, and MediCal. Most undocumented immigrants who achieve a legal status would not become eligible for assistance until Fiscal Year 1992-1993. Undocumented immigrants are entitled to use county General Relief programs until they become eligible for other state and federal assistance programs.

Aid to Families with Dependent Children (AFDC). AFDC payments are made primarily to needy families with children, but AFDC benefits are also available to unemployed heads-of-household and to participants in foster care programs. On average in 1986, there were 870,000 monthly AFDC recipients in the region (6.4 percent of the region's population) and approximately 70 percent of these beneficiaries were children. Counties pay approximately 5

percent of assistance payment costs and 25 percent of administrative costs, with the state and federal government paying the balance. Annual payments to residents of the region in 1986 totaled approximately $1.8 billion. (Southern California Association of Governments 1987)

Food Stamp Program. The food stamp program operates on a voucher system in which eligible participants use special stamps, instead of direct payment, for the purchase of food items. Approximately 738,000 people in the region (5.8 percent of the total population) currently use food stamps. Counties pay 25 percent of administrative costs. All other program costs are paid by the state and federal government.

MediCal. MediCal (state health assistance) is available to qualifying low income individuals, including those receiving AFDC cash assistance, and aged, blind, and disabled persons receiving SSI/SSP benefits. During Fiscal Year 1985-86, 1.2 million persons in the region (9.6 percent of the total population) were enrolled in MediCal. The program is funded by the state and federal government, but public hospitals and clinics are contractually obligated to treat MediCal patients and must absorb those costs that are not fully reimbursed by the program. Counties provide medical assistance to undocumented immigrants and to indigent adults who are not eligible for MediCal.

Other Social Service Programs

Social programs in the region include family and personal support programs such as counseling services, drug rehabilitation, youth and recreation programs, adoption services, in-home support services for the elderly, adult day-care, child care, handicapped services, emergency food and shelter services, legal aid, hospice programs, translation and cultural transition programs for new immigrants (e.g., English as a Second Language programs), and community center programs. Agencies also sponsor intervention programs (e.g., suicide prevention, rape response, and respite programs) and provide protective services (e.g., child abuse and protection, foster care, and adult protective services). Many of these programs are greatly overburdened and underfunded, with demand for services substantially exceeding available resources.

Child care is a growing service in the region as more and more women join the labor force. Child care is provided in private homes, special centers, and schools. Most facilities operate for profit, although some are nonprofit and receive public subsidies for offering services to low or moderate income families. A major shortage of child care facilities exists in the region. In Los Angeles County, for example, approximately 240,000 K-6 grade students need supervised care before and after school, but there are only 47,000 licensed and unlicensed school age child care spaces available countywide (Southern California Association of Governments 1987). Employer-supported child care is available on a very limited basis, but is expected to become more prevalent as the economy adjusts to the needs of women in the work force.

Impacts and Mitigation Measures

Proposed Project

Impact: Increased Need for Health Care Services and Facilities

The age group of 65 years and older is projected to more than double by 2010 under the proposed project, as shown in Table 6-10, growing from 1.1 million people in 1980 to 2.3 million in 2010. The 85 years and older population would grow most rapidly (340 percent) during this period.

Using the present ratio of 47 skilled nursing beds per 1,000 people 65 years and older, the health care system would need approximately 51,000 more skilled nursing or intermediate care facility beds by 2010, nearly doubling the existing inventory. Based on the current average of 93 beds per facility, at least 500 additional skilled nursing facilities would be needed in the SCAG region by 2010. It is anticipated that growth of the elderly population would place a growing demand on nursing homes and other facilities that serve this population.

Effects on health care services, however, would not be limited to the elderly. The growth of the overall population by more than 5 million people would increase demands on existing services in the region, including the need for more professional staff and facilities. Prenatal, postnatal, and pediatric health care needs would increase, particularly among minority populations with relatively high fertility rates.

Continued immigration poses challenges to the region's health care delivery system, as more than 3.3 million immigrants are expected to settle in the region by 2010. Since immigrants come from countries with different health standards than the U. S., preventive and public health care services (e.g., general check-ups, dental care, and immunizations) would be a continuing priority in serving this population.

The region's health care system would also need the resources and flexibility to respond effectively to new or growing public health demands. These would include programs that address the needs of the mentally ill homeless and persons with Acquired Immune Deficiency Syndrome (AIDS) as well as other diseases such as Alzheimer's.

This impact is considered significant. The following measures would be required to reduce this impact to a less-than-significant level.

Mitigation Measures

- Public and private health service providers should expand staff and facilities as needed. Facilities operating by 2010 should include at least 500 new skilled nursing facilities and additional hospitals, intermediate care facilities, and clinics. Providers should improve salaries and working conditions to attract and retain a sufficient number of skilled nurses and other medical personnel.

Table 6-10. Population Projections for Age Group 65 Years and Older in 1980 and Under Proposed Project and Alternatives (2010)

Age Group	1980 (in 1,000s)	2010 (in 1,000s)	Percentage Increase (1980-2010)
65-74	680.2	1,179.9	73
75-84	349.1	693.1	99
85 and over	104.5	459.8	340
Total - 65 and over	1,143.8	2,332.8	104
Total - 75 and over	453.7	1,152.8	154

Source: Southern California Association of Governments 1987)

- o Public agencies and private organizations should expand subsidized health care services and provide more comprehensive health insurance coverage to those who cannot afford the costs of services, particularly to families with young children, the elderly, and those with acute health care needs.

- o Health service providers should develop and expand innovative, affordable, and cost-effective alternatives such as preventative care, adult day care, and home health care services.

Impact: Increased Need for Public Assistance.

Projections of increased demand on major public assistance programs that would be associated with the proposed project were calculated by applying current usage rates to future population levels. Demand for social services, however, would not necessarily grow in direct proportion to population growth. Many factors would affect demand, particularly socioeconomic characteristics such as income levels, unemployment rates, education levels, and age structure.

Assuming that 6.4 percent of the future population required AFDC assistance, approximately 1.2 million people would receive AFDC payments in 2010 at an annual cost of $2.6 billion in current dollars. Costs may actually be lower since children aged 0-18 years, who are the primary recipients of AFDC, would constitute a smaller proportion of the population in future years under these projections. Assuming that 5.8 percent of the population continues to use food stamps, this program would serve more than 1 million people in 2010 and cost an estimated $560 million annually in current dollars. Assuming that 9.6 percent of the population were to use the MediCal program, approximately 1.8 million people would be enrolled by 2010 and annual payments would be approximately $3 billion in current dollars.

This impact is considered significant. The following measures would be required to reduce this impact to a less-than-significant level.

Mitigation Measures

- o Local, state, and federal government agencies should increase the efficiency of the Food Stamps and MediCal programs to better serve those in need.

- o Public agencies and private organizations should reduce the level of future demand for public assistance by jointly developing and implementing innovative and cost-effective education, job training, job placement, child care, and family support programs.

Impact: Increased Need for Other Social Services

Demand for a range of other services would also increase as a result of population growth and demographic change. Growth of the 65 and over age group would substantially increase demand for various services, including in-home support services, adult day care, handicapped/disabled assistance, legal aid, and adult protective services. Programs that address the needs of immigrants (e.g., English as a Second Language, adult education, refugee

assistance, and cultural transition programs) would continue to be in great demand based on projected levels of immigration. Overall population growth by 2010 is expected to increase demand for social services in general, including family and personal support programs, crisis intervention programs, and various protective services.

The demand for child care facilities and services would increase as more and more women are predicted to join the labor force and the number of children grows. The labor force participation rate of women aged 25-54 would increase from 65 percent (1980) to 81 percent (2010) and the infant and preschool age population (0-4 years) would increase by 53 percent, from 863,000 (1980) to 1.3 million (2010). The 5-14 age group, which often requires child care during nonschool hours, would grow by 43 percent in this period. Based on these trends and existing shortages, a major expansion of child care services in the region would be needed.

This impact is considered significant. The following measures would be required to reduce this impact to a less-than-significant level.

Mitigation Measures

- Employers in the region should participate directly or indirectly in providing or supporting child care services.
- Service providers should develop and expand innovative, affordable, and cost-effective programs for delivering social services to the elderly, children, and the general population.

GMA-1

Impact: Increased Need for Health Services and Facilities, Public Assistance, and Other Services

The increased need for these services that would result from GMA-1 would be comparable to those described above for the proposed project.

This impact is considered significant. The following measures would be required to reduce this impact to a less-than-significant level.

Mitigation Measures

- Same as those identified above for the proposed project.

GMA-2, GMA-3, and GMA-4

Effects on health care and social services at a regional level that would result from GMA-2, GMA-3, and GMA-4 would be comparable to those described above for the proposed project.

GMA-Low

The demand for public services would generally be less under GMA-Low than under the proposed project or GMA-1 because of the smaller population to be served. The level of demand for services that would occur under GMA-Low has not been quantified, and the relative effect of GMA-Low on public services would be comparable to those discussed for the proposed project and GMA-1.

GMA-High

The demand for public services would generally be greater under GMA-High than under the proposed project or GMA-1 because of the larger population to be served. The level of demand for services that would occur under GMA-High has not been quantified, and the relative effect of GMA-High on public services would be comparable to that discussed for the proposed project and GMA-1.

ENERGY

Setting

Existing Demand and Supply

Since the service areas of the major utilities supplying the region include areas outside the SCAG region, the total demand for these utilities exceeds regional demand. Regional demand estimates for electricity, natural gas, and motor fuel in 1980 and 2010 are shown in Table 6-11. Regional demand was estimated based on household and employee generation rates (Southern California Association of Governments 1982).

Electricity. The Southern California Edison Company (SCE), the Los Angeles Department of Water and Power (LADWP), and the Burbank, Glendale, and Pasadena Departments of Public Service supply electricity to 95 percent of the households in the region. Remaining households are served by the San Diego Gas and Electric Company (SDGE) or the Imperial Irrigation District (IID).

The SCE service area includes all of Ventura and San Bernardino Counties, northern Los Angeles County, most of Orange and Riverside Counties, and northern Imperial County; the area also extends north of the SCAG region into seven other counties in California's central valley and Sierra Nevada regions. LADWP's service area includes the City of Los Angeles and portions of Inyo and Mono Counties. The service area for the Burbank, Glendale, and Pasadena Departments of Public Service includes the cities of Burbank, Glendale, and Pasadena. The SDGE service area includes most of San Diego County and a portion of southern Orange County. The IID service area includes most of Imperial County and southcentral Riverside County. SDGE serves only about 6 percent of Orange County households and is therefore not included in the following discussion.

Table 6-11. Annual Regional Energy Consumption Projections in Base Year and Under Proposed Project and Alternatives (2010)

	Unit of Measurement	Consumption in Base Year	Consumption in 2010	Increase in Consumption (Base Year to 2010)	Percentage Consumption Increase (Base Year to 2010)
Electricity	Gigawatt-hours (Gwh)	76,100 Gwh (1980)	117,600 Gwh	41,500 Gwh	54.5
Natural Gas	Billion cubic feet (bcf)	675 bcf (1980)	935 bcf	260 bcf	38.5
Motor Fuel	Million Gallons (MG)	6,096 MG (1979)	6,346-6,864 MG	250-768 MG	4.1-12.6

Source: Southern California Association of Governments (1982, 1988)

Notes: (a) Projections are based on housing, employment, and energy consumption estimates for 1979 and 1980, future year generation factors, and 2000 energy use projections in previous SCAG analyses (Southern California Association of Governments 1982); 2010 regional housing and employment projections (Southern California Association of Governments 1988); and 2010 vehicle-mile projections (see Chapter 7). It was assumed that new housing units developed between 1980 and 2010 would demand 5,913 killowatt-hours (Kwh) of electricity and 51,830 cubic feet (cf) of natural gas per unit per year on average. Projections for commercial and industrial uses are based on the increase in employees expected by 2010, using annual averages of 5,569 Kwh and 13,542 cf per employee for commercial uses and 205,787 cf per employee for industrial uses. It was assumed that 90 percent of all new jobs created in the region between 1980 and 2010 would be classified as commercial and 10 percent would be classified as industrial, based on employment by sector as described in Chapter 4.

Electricity demand and supply may be assessed during peak (high demand) periods or over longer periods of time. Electrical utilities must build sufficient facilities to meet peak demand, since inadequate peak capacity would result in brownouts or blackouts. Peak capacity is measured in millions of watts or megawatts. The amount of energy provided and consumed over a longer term (e.g., 1 year) is measured in billions of watt-hours or Gigawatt-hours (Gwh).

Regional demand for 1980 was approximately 76,100 Gwh, distributed evenly among residential, commercial, and industrial users. In 1979, the three main utilities serving the region supplied a total of 86,700 Gwh to their service areas; the SCE, LADWP, and Burbank/Glendale/Pasadena supplied

64,700, 19,500, and 2,500 Gwh, respectively. (Southern California Association of Governments 1987). LADWP supplies increased by nearly 3,000 Gwh (15 percent) to 22,400 Gwh in 1984 (Mureau pers. comm.).

Most electrical energy is generated within the region, but a substantial portion is generated at power stations outside the region. Because of air quality concerns, development of new or expanded generating facilities within the Southern California Air Quality Management District is unlikely and utilities are seeking additional power supplies from areas outside the region such as the Pacific Northwest and Canada (Mureau pers. comm.).

Both SCE and LADWP are heavily dependent on oil and natural gas for generation of electrical capacity. Hydroelectric power and coal are other primary sources for these utilities. Because the predominant fuel used in generating electricity is oil, regional supply is highly sensitive to changes in oil prices and to potential disruption of oil supplies. Natural gas availability is highly variable because of changes in total supply and allocations by the State Public Utilities Commission to other sectors (residential uses have the highest priority and utility steam-electric generating plants have the lowest priority).

Natural Gas. The only major supplier of natural gas in the region is the Southern California Gas Company (SCG). SCG serves the entire region except the City of Long Beach, which purchases a majority of its supplies from the SCG. The SCG service area includes coastal and inland valley areas north of the SCAG region (Santa Barbara, San Luis Obispo, Kern, Kings, Tulare, and Fresno Counties). Out-of-state sources have provided most of southern California's natural gas supplies, with two companies (El Paso Natural Gas Company and Transwestern Pipeline Company) providing more than 75 percent of supplies between 1976 and 1979 (Southern California Association of Governments 1982).

Regional natural gas demand for 1980 was approximately 675 cubic feet (cf). Nearly half (49 percent) of this demand was from residential users, 39 percent was from industrial users, and 12 percent was from commercial users. Major applications of natural gas in the residential sector are for space and water heating.

Transportation Energy. At present, transportation in the SCAG region is totally dependent on petroleum-based fuels. The following discussion focuses on fuel consumption by on-road vehicles within the region in 1979,

automobile fuel economy trends, and future prospects for petroleum supplies and other fuels.

The region consumes nearly half of all the gasoline and diesel fuel used in California. In 1979, 63 percent of regional gasoline consumption by gallons was used by automobiles, 21 percent by light and medium-duty trucks, and 16 percent by heavy-duty vehicles.

The average fuel economy of the automobile fleet is a critical determinant of regional motor fuel consumption. Effective average fuel economy in 1979 was approximately 12.5 miles per gallon (mpg) for light-duty vehicles and 4.6 mpg for heavy-duty vehicles. Since fuel economy of new vehicles has increased in recent years, total fuel consumption has declined slightly although total travel mileage has grown. The trend toward greater fuel economy is expected to continue as a result of federal standards and rising costs. The average fleet fuel economy in 2000 is projected to be 24 mpg, assuming that fuel costs in that year are equivalent to those in 1980 in real dollars (Southern California Association of Governments 1982).

Petroleum or crude oil is the primary source of all transportation fuels used in the region with major oil refineries concentrated in the Los Angeles-Long Beach Harbor area. Most crude oil processed in the region is provided by domestic sources in California and Alaska. Oil reserves in both states are expected to last to 2000 and beyond. However, California is ultimately dependent on the world oil market. The California Energy Commission (CEC) has projected that proved oil reserves worldwide can sustain current levels of fuel consumption for less than 30 years and that other petroleum resources would be sufficient to sustain fuel consumption at these levels for up to 144 years (Southern California Association of Governments 1982).

Impacts and Mitigation Measures

Regional electricity, natural gas, and motor fuel consumption projections to 2010 for the proposed project and alternatives are shown in Table 6-11. These estimates do not consider the effects of factors that could influence energy consumption levels at the regional and subregional level, such as the geographic distribution of growth, climate zones, housing unit types, and increased costs in real dollars. Air conditioning demand, for example, is much greater in warm inland areas of the region than in cooler coastal areas. Multifamily housing units consume less energy on average than single-family units.

Proposed Project

Impact: Increased Electricity and Natural Gas Demand of 41,500 Gigawatt-Hours and 260 Billion Cubic Feet Per Year. Regional consumption of electricity is expected to increase by 41,500 Gwh (54.5 percent) from 76,100 Gwh in 1980 to 117,600 Gwh in 2010, and regional consumption of natural gas would increase by 260 billion cubic feet (bcf) (38.5 percent) from 675 bcf in 1980 to 935 Bcf in 2010, as shown in Table 6-11. Natural gas consumption is expected to grow at a lower rate because of a substantial decline

in the use of natural gas for electrical power generation as well as conservation measures and equipment efficiency improvements in the residential and commercial sectors (Southern California Association of Governments 1982).

Electricity. Generating plants that supply electricity for the region are expected to reduce their reliance on oil and natural gas in the future, while increasing their reliance on coal, nuclear power, and renewable or alternative resources and technologies. SCE, for example, plans to derive more than one-third of the utility's increased electricity-generating capacity by 2000 from solar, geothermal, fuel cells, and cogeneration. Decreasing reliance on oil and natural gas, particularly supplies imported from foreign sources, would improve the overall security of the region's electricity supply.

The ability of utilities to increase their electricity-generating capacity will depend upon approvals of the CEC, which are based on forecasts of future demand by utilities and the CEC. Since SCAG regional demand projections have historically been comparable to those of the CEC, it is expected that sufficient projects will be approved by the CEC to meet future regional demand (Southern California Association of Governments 1982).

According to forecasts prepared by the utilities, electricity demand from 1987 to 2007 will increase in the respective service areas by 31,600 Gwh (44.2 percent) for SCE, 9,200 Gwh (41.1 percent) for LADWP, 888 Gwh (31.6 percent) for Burbank, Glendale, and Pasadena Departments of Public Service, and 836 GwH (47.5 percent) for IID (California Energy Commission 1988; Mureau and Murphy pers. comms.). SCE's and LADWP's projections indicate that peak demand in 2007 (approximately 7,000 and 26,000 megawatts, respectively) would represent approximately 95 and 83 percent of capacity (8,475 and 27,380 megawatts) in that year (Johnson and Mureau pers. comm.).

Increased generating capacity may also be provided by conservation, the least expensive measure for augmenting supply. The energy demand projections presented in this section are based on expected results of energy saving programs that are currently being implemented. Considerable potential remains for conserving electricity, particularly in the commercial sector. Supply projections assume that currently planned projects are completed and operated as expected. Project restrictions, delays, and cancellations may occur as a result of large financial commitments, the review and approval process, and operating constraints.

Natural Gas. Projections of future natural gas resources available to Southern California suppliers in 1980 indicate that total available annual supply from 1979 to 2000 would decline by approximately 115.1 bcf (16 percent). According to these forecasts, utilities would become increasingly reliant on newer and more expensive sources of natural gas as the amount of natural gas supplied by traditional sources in California, offshore areas, and the southwest declines.

Because of overall supply constraints and use priorities, natural gas supplies could be unavailable or insufficient for electrical generation, particularly in periods of high demand or low supply. In order to meet

future demand, new natural gas sources must be more fully identified and transportation and storage infrastructure must be developed. Critical shortfalls could occur if such projects are delayed or supplies from these sources are substantially less than projected.

This impact is considered significant but could be reduced to less than significant through implementation of the following measures.

Mitigation Measures

- Utilities, local jurisdictions, and residents should participate in implementation of the following measures:

  - reduce overall future electricity demand in the region by 20 percent or 22,600 Gwh/yr through energy conservation (Southern California Association of Governments 1982);

  - reduce overall future natural gas demand in the region by 15 percent or 111.62 bcf/yr through energy conservation;

  - reduce total annual residential sector demand by 25 percent or 8,500 Gwh and 73.22 bcf per year by applying California Title 24 building standards and state and federal appliance efficiency standards to all new construction, requiring retrofitting of existing buildings (e.g., weatherstripping and insulation) as feasible, shifting consumption to off-peak hours by developing and implementing residential load management standards and rate adjustments (Southern California Association of Governments 1982);

  - reduce total annual commercial sector demand by 30 percent or 10,000 Gwh and 23.14 bcf per year by implementing Title 24 nonresidential building standards to all new construction, installing cost-effective conservation measures in existing commercial buildings, and developing and implementing lighting and commercial appliance efficiency standards (Southern California Association of Governments 1982);

  - reduce total annual industrial sector demand by 5 percent or 2,600 Gwh and 15.22 bcf per year by implementing increased motor and operation and control efficiency standards, installing cost-effective energy conservation equipment on industrial facilities (e.g. boilers), and increasing agricultural pumping efficiency (Southern California Association of Governments 1982);

  - provide incentives for cleaner and less energy-intensive industrial development, and promote cogeneration and other practices to reduce manufacturing and industrial energy consumption;

  - increase the use of renewable and alternative energy sources (e.g., wind and geothermal) that generally are less capital-intensive and have shorter development lead times than conventional sources; and

- apply measures recommended in the AQMP that would reduce overall the generation of fossil fuel-based electricity within the air basin.

Impact: Increased Motor Fuel Demand of 250-768 Million Gallons Per Year. Regional consumption of motor fuel by on-road vehicles is expected to increase by 250-768 million gallons (mg) (4.1-12.6 percent) from 6,096 mg in 1980 to 6,346-6,864 mg in 2010. Fuel consumption would increase at a much lower rate than regional population or employment as a result of expected increases in fuel economy.

Estimates of fuel consumption depend on vehicle miles traveled (VMT) and fuel economy in mpg. Projections for the proposed project are based on previous regional transportation energy forecasts and analysis (Southern California Association of Governments 1982), adjusting these to correspond with the higher VMT estimate that has been developed for the proposed project (see Chapter 7). It was assumed for purposes of this analysis that average fuel economy would increase by 2010 to the levels forecast for 2000 in SCAG's 1982 study.

Population growth tends to increase travel, vehicle fuel consumption, and congestion. Increased congestion generally reduces average fuel economy (increasing fuel consumption), but may ultimately restrict fuel consumption by limiting mobility and changing transportation patterns. Given the projected levels of population growth and traffic congestion in the region (see Chapter 7), average fuel economy may not increase as much as has been assumed. Major technological fuel efficiency increases would be required to achieve this level of overall fuel economy despite increased VMT and congestion.

An adequate supply of petroleum-based fuels may be available to meet future regional demand. The feasibility and use of alternative vehicle fuels (e.g. alcohols, coal-derived hydrocarbons, shale-derived hydrocarbons, hydrogen, methane, and electrical power) are largely unproven. Due to the region's dependence on worldwide oil markets, the increased instability of oil supplies and costs, and the uncertain feasibility of alternative vehicle fuels, this impact could be significant. This impact could be reduced to less than significant through implementation of the following measures.

Mitigation Measures

o Transportation agencies, local jurisdictions, employers, residents, and the automobile industry should participate in implementation of the following measures:

  - increase average vehicle fuel economy, particularly that of light-duty passenger vehicles, through technological change (Southern California Association of Governments 1982);

  - increase the use of vehicles with greater fuel economy through increased fuel costs, taxes, or other economic incentives;

  - increase the use of alternative or renewable energy sources (e.g., alcohol or other liquid fuels from biomass, hydrogen

produced from solar or wind power, or the direct use of electricity generated by solar or wind power);

- plan future growth so as to minimize transportation energy use by promoting mixed-use development, public transit, nonmotorized travel, and beneficial social or technological developments (e.g. telecommunications); and

- reduce projected levels of future traffic congestion by implementing the preferred RMP strategy as described in Chapter 7.

GMA-1

Impact: Increased Electricity, Natural Gas, and Motor Fuel Demand. The increased regional demand for electricity, natural gas, and motor fuel that would result from GMA-1 would be generally comparable to increased energy demand under the proposed project.

GMA-1 could result in less overall demand for electricity and natural gas than the proposed project, since it would generate substantially greater employment growth and somewhat less housing development in coastal areas (e.g., Orange County) that typically require less energy because of more temperate climate. GMA-1 could result in a higher level of demand for motor fuel, however, since it would generate approximately 8.5 percent more VMT in 2010 as discussed in Chapter 7.

This is considered a significant impact but could be reduced to less than significant through implementation of the following measures.

Mitigation Measures

o Same as those identified for the proposed project.

GMA-2, GMA-3, and GMA-4

GMA-2 would result in less overall energy demand than the proposed project. Less energy would be required as a result of proportionately more residential, commercial, and industrial development in coastal areas where housing densities would be higher and energy requirements for land uses would generally be lower. A greater J/H balance within subregions would reduce future commuting levels (VMT) and thereby generate less future demand for motor fuel.

GMA-3 would generate an increase in demand for electricity and natural gas comparable to that which would result from the proposed project. Residential energy demand would be higher as a result of proportionately greater housing development in less temperate inland areas of the region. Nonresidential energy demand would be lower, however, as a result of greater commercial and industrial development in coastal areas.

GMA-4 could result in less overall energy demand than the proposed project. Residential energy demand would be somewhat higher as a result of

slightly greater housing development in less temperate inland areas of the region. Nonresidential energy demand would be lower, however, as a result of greater commercial and industrial development in coastal areas. A greater J/H balance within subregions would reduce future commuting levels (VMT) and thereby generate less future demand for motor fuel.

GMA-Low

The demand for public services would generally be less under GMA-Low than under the proposed project or GMA-1 because of the smaller population to be served. The level of demand for services that would occur under GMA-Low has not been quantified, and the relative effect of GMA-Low on public services would be comparable to those discussed for the proposed project and GMA-1.

GMA-High

The demand for public services would generally be greater under GMA-High than under the proposed project or GMA-1 because of the larger population to be served. The level of demand for services that would occur under GMA-High has not been quantified, and the relative effect of GMA-High on public services would be comparable to that discussed for the proposed project and GMA-1.

CHAPTER 7. TRANSPORTATION

SETTING

The following transportation analysis identifies existing and future transportation conditions for the 1984 base year and 2010 future year. For purposes of this analysis, the 1984 base traffic model results published by SCAG will be used as an evaluation of existing conditions, and will be the basis for comparison to the proposed project and the alternatives (Southern California Association of Governments 1985b). The SCAG transportation modeling region includes the urbanized and urbanizing portions of five counties--Los Angeles, Orange, Riverside, San Bernardino, and Ventura.

Methodology

The SCAG regional transportation modeling process was used to both estimate existing conditions and predict future year traffic patterns. The process consists of the four traditional travel demand forecasting procedures--trip generation, trip distribution, mode split, and traffic assignment (Falter 1985).

Before the modeling process began, the socioeconomic data for the analysis year was disaggregated from regional statistical areas to 1,285 analysis zones, using a combination of trend analysis, negotiations, and informed professional judgment.

The number of weekday trips was then generated by housing type in each zone as a function of housing type, population, and median income. The relative number of trips attracted to each zone was predicted as a function of zonal population, retail employment, and other employment.

Trip distribution determines where the trips will go. The number of trips between a zone pair was predicted according to the relative attraction of each zone and the values of some aggregate supply measured over all modes and routes.

The choice of mode (transit or auto with one, two, three, or more occupants) for work trips between each zone pair was predicted as a function of travel cost and time for each mode, and of zonal characteristics. These characteristics include employment density, parking cost, income, auto ownership, household size, number of licensed drivers, and number of workers.

The final step, trip assignment, predicted the routes that the trips will take; resulting in traffic forecasts for the highway system and ridership forecasts for transit. Vehicle trips were assigned to the highway network with iterative capacity restraint methods for peak period trips and with

multipath assignment techniques for off-peak period trips. Capacity restraint techniques are based on the finding that as the volume of traffic on a facility increases, speeds decrease, and the relative attractiveness of a particular path declines. Trips are assigned in iterations based on the reevaluated status of paths at each iteration. In multipath assignment, the probability of a path being chosen is dependent on the impedances, (such as time, cost, and distance) associated with it. Transit trips were assigned to minimum impedance paths on the transit network.

The model output produces several kinds of statistical measures. Some of the most useful information is summarized in tables presented later in this chapter.

Existing Transportation Facilities Network

The 1984 base network represents the transportation system as it existed in 1984. The highway network includes all of the state highways, freeways, expressways, and major arterials. It also includes most secondary arterials, plus connector streets where necessary, for a total of 56,539 lane-miles of roadway. Approximately 60 percent of the lane-miles are in Los Angeles County.

The 1984 transit model network is based on the Southern California Rapid Transit District (SCRTD) network depicting December 1983 facilities and service, with updates to represent July 1984 facilities. The levels of service represent the morning (a.m.) peak period. The network contains 483 lines covering 14,974 route miles in five counties. With no rail facilities, the network's highest speeds are attained by express buses, averaging 16.9 miles per hour (mph) (Southern California Association of Governments 1985b).

Existing Traffic Conditions

Vehicular Travel

In 1984, the highway network carried a total of 40.2 million person-trips daily, of which 7.2 million (18 percent) were home- work trips. Most of the trips occurred in Los Angeles County (63 percent) and Orange County (19 percent). Riverside, San Bernardino, and Ventura Counties each had less than 3 million person-trips (Tables 7-1 and 7-2).

Regionwide, 89 percent of all home-work trips were intracounty in 1984. Los Angeles County had 96 percent of its home-work trips entirely within the county. Riverside County had the lowest percentage of intracounty home-work trips (Table 7-3).

A high level of intercounty commuting is a general indicator of long distance home-work trips. Table 7-4 and Figure 7-1 show the impact the large employment centers in Los Angeles County have on the amount of inter-county travel. Although Los Angeles has a high percentage of intracounty

Table 7-1. Total Daily Person-Trips (in Thousands) (and Percent Increase over the 1984 Base Year) by County, for 1984, Proposed Project, and Alternatives[a]

	Ventura County	Los Angeles County	Orange County	Riverside County	San Bernardino County	Regional Total[b]
1984	2,182	25,450	7,766	1,987	2,859	40,244
2010 Proposed Project (GMA-4 Modified)	3,278 (50%)	32,156 (26%)	11,315 (46%)	4,708 (137%)	5,870 (105%)	57,324 (42%)
Alternatives						
GMA-1 (No Project)	3,228 (48%)	31,470 (24%)	11,863 (53%)	4,831 (143%)	5,591 (96%)	56,982 (42%)
GMA-2	3,275 (50%)	31,769 (25%)	11,951 (54%)	4,732 (138%)	5,675 (98%)	57,401 (43%)
GMA-3	3,277 (50%)	31,850 (25%)	10,349 (33%)	5,169 (160%)	6,055 (112%)	56,701 (41%)
GMA-4	3,371 (54%)	32,129 (26%)	11,370 (46%)	4,477 (125%)	5,659 (98%)	57,006 (42%)
GMA-Low	3,218 (47%)	31,587 (24%)	11,192 (44%)	4,520 (127%)	5,658 (98%)	56,176 (40%)
GMA-High	3,705 (70%)	34,634 (36%)	12,353 (59%)	5,602 (182%)	6,883 (141%)	63,177 (57%)

Source: Unpublished data from the Southern California Association of Governments 1988.

[a] Based on productions.

[b] Totals may not add up due to rounding.

Table 7-2. Daily Home-Work Person-Trips (in Thousands) (and Percent Increase over the 1984 Base Year) by County, for 1984, Proposed Project, and Alternatives[a]

	Ventura County	Los Angeles County	Orange County	Riverside County	San Bernardino County	Regional Total[b]
1984	359	4,574	1,541	331	458	7,261
2010 Proposed Project (GMA-4 Modified)	531 (48%)	5,791 (27%)	2,270 (47%)	801 (142%)	946 (107%)	10,337 (42%)
Alternatives						
GMA-1 (No Project)	531 (48%)	5,612 (23%)	2,330 (51%)	865 (161%)	940 (105%)	10,278 (42%)
GMA-2	532 (48%)	5,741 (26%)	2,403 (56%)	789 (138%)	908 (98%)	10,373 (43%)
GMA-3	532 (48%)	5,713 (25%)	2,062 (34%)	906 (174%)	977 (113%)	10,191 (40%)
GMA-4	544 (52%)	5,751 (26%)	2,272 (47%)	781 (136%)	935 (104%)	10,283 (42%)
GMA-Low	521 (45%)	5,681 (24%)	2,246 (46%)	769 (132%)	910 (99%)	10,127 (39%)
GMA-High	599 (69%)	6,212 (36%)	2,488 (61%)	956 (189%)	1,117 (144%)	11,373 (57%)

Source: Unpublished data from the Southern California Association of Governments 1988.

[a] Based on productions.

[b] Totals may not add up due to rounding.

Table 7-3. Total Home-Work Intracounty Trips (in Thousands) (and Percent of Total County Home-Work Person-Trip Productions) by County, for 1984, Proposed Project, and Alternatives

	Ventura County	Los Angeles County	Orange County	Riverside County	San Bernardino County	Regional Total
1984	281 (78%)	4,378 (96%)	1,222 (79%)	225 (68%)	322 (70%)	6,428 (89%)
2010 Proposed Project (GMA-4 Modified)	423 (80%)	5,515 (95%)	1,832 (81%)	565 (71%)	713 (75%)	9,048 (88%)
Alternatives GMA-1 (No Project)	402 (76%)	5,319 (95%)	1,933 (83%)	515 (60%)	630 (67%)	8,799 (86%)
GMA-2	430 (81%)	5,442 (95%)	1,966 (82%)	586 (74%)	681 (75%)	9,105 (88%)
GMA-3	422 (79%)	5,440 (95%)	1,637 (79%)	596 (66%)	734 (75%)	8,829 (87%)
GMA-4	435 (80%)	5,489 (95%)	1,832 (81%)	511 (65%)	667 (71%)	8,934 (87%)
GMA-Low	414 (79%)	5,416 (95%)	1,802 (80%)	541 (70%)	683 (75%)	8,861 (87%)
GMA-High	477 (80%)	5,923 (95%)	1,995 (80%)	675 (71%)	840 (75%)	9,910 (87%)

Source: Unpublished data from the Southern California Association of Governments 1988.

Table 7-4. Intercounty Home-Work Person Trips for Selected Origins and Destinations

			Year 2010						
				Alternatives					
Origin County	Destination County	Year 1984	Proposed Project (GMA-4 Modified)	GMA-1 (No Project)	GMA-2	GMA-3	GMA-4	GMA-Low	GMA-High
Orange	Los Angeles	310,939	417,224	387,027	413,331	410,186	426,711	423,613	469,468
Riverside	Los Angeles	29,667	53,753	103,328	39,954	73,883	76,979	52,914	65,716
San Bernardino	Los Angeles	81,079	128,817	189,539	123,863	148,678	161,422	126,275	155,370
Ventura	Los Angeles	76,482	106,089	127,426	100,359	108,936	107,308	104,962	119,921
Riverside	Orange	26,997	50,104	111,159	41,205	65,246	69,858	47,701	58,128
San Bernardino	Orange	17,978	30,945	64,194	32,691	38,368	41,046	29,437	35,627
San Bernardino	Riverside	36,516	72,621	55,920	69,368	55,114	64,012	69,734	85,027
Riverside	San Bernardino	48,945	131,561	134,153	120,970	170,540	122,544	126,807	156,336

Source: Unpublished data from the Southern California Association of Governments 1988.

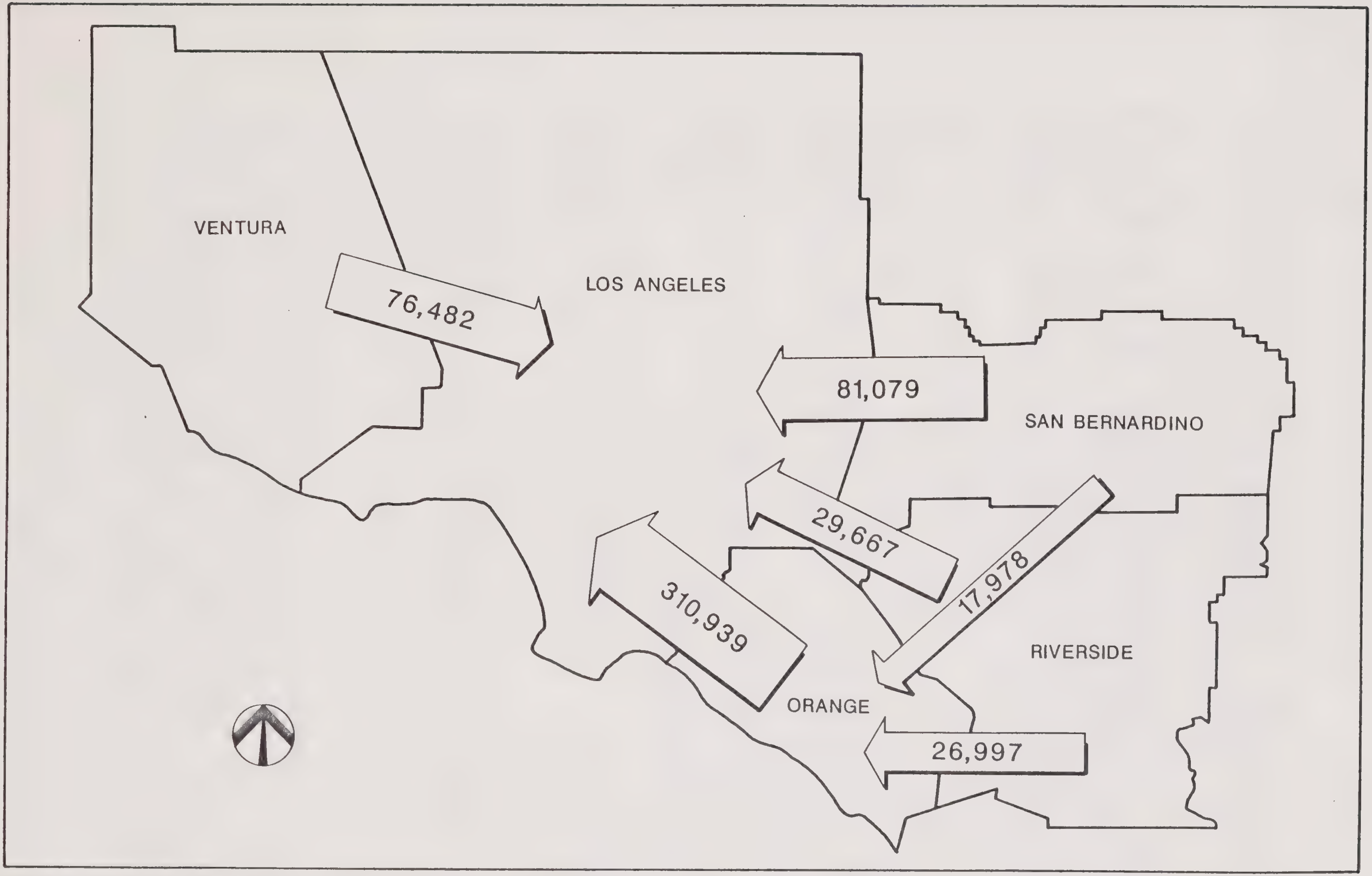


FIGURE 7-1. EXISTING INTER COUNTY HOME TO WORK TRIPS, 1984 BASE YEAR

home-work trips, the large employment base attracts large numbers of commuters from areas as far away as eastern San Bernardino and northern Ventura Counties, resulting in about 500,000 home-work trips to Los Angeles County with origins outside the county.

Regionwide in 1984, the average home-work person-trip was 10.7 miles long and took 22.5 minutes. The average person-trip length for all trip purposes was 7.6 miles and took only 13.5 minutes-- about half the time of the average home-work trip (Table 7-5). The average length for home-work trips is only 3.1 miles longer than for all trip purposes; however, the trip time is 9 minutes longer, a considerable delay occurring because most home-work trips are made during the peak periods when congestion is substantial and travel speeds are low.

Table 7-6 and Figure 7-2 show the amount of delay in hours and percent for 1984. Delay represents the proportion of a trip that is spent in less than free-flow conditions. On the average, 10 percent of the time for each trip (or 6 minutes per hour) is currently spent in delay due to traffic congestion.

The average speed on freeways in the region also reflects the amount of congestion. Although the speed limit for most freeway facilities is 55 mph, the average speed is only 47 mph. The average speed for all facility types is 35 mph under base year conditions.

Currently, an average of 221.3 million vehicle miles are traveled daily on the existing highway network (Table 7-7). Sixty-four percent of the vehicle miles traveled (VMTs) are in Los Angeles County. The fewest VMTs occur in Ventura County (only 4.6 percent).

The number of miles of congestion, as shown in Tables 7-8 and 7-9, are defined by a volume to capacity ratio of 1.0 or greater. Regionwide, more than 400 miles of roadway are congested during the current pm peak period. Most of that congestion occurs in Los Angeles and Orange Counties on freeway facilities.

In terms of transit, 6.6 percent of the home-work trips are made via this high occupancy mode, for a total of 849,000 daily transit trips. Half of the transit trips are on RTD local service. About 30 percent are on RTD express service. The remaining occur on other local transit services (Table 7-10).

Air Travel

While the transportation system must meet the needs of travel within the SCAG region, it must also provide for travel to and from other regions in the state, nation, and around the world. Some of this inter-regional travel is accommodated by the region's airports. The regional airport system consists of 56 public use and military airports. The SCAG region is the densest air traffic region in the U. S. in terms of airports and aircraft operations. In 1984, passenger activity stood at 44.7 million annual passengers (MAP) for the region (Southern California Association of Governments 1987).

Table 7-5. Regional Average Person-Trip Lengths (and Percent Increase over 1984 Base Year) for 1984, Proposed Project, and Alternatives

	Trip Purpose	
	Home-Work	Total
1984	22.5 minutes 10.7 miles	13.5 minutes 7.6 miles
2010		
Proposed Project (GMA-4 Modified)	23.2 minutes (3.1%) 11.4 miles (6.5%)	14.3 minutes (5.9%) 8.2 miles (7.9%)
Alternatives		
GMA-1 (No Project)	24.8 minutes (10.2%) 12.4 miles (15.9%)	15.1 minutes (11.9%) 8.9 miles (17.1%)
GMA-2	22.9 minutes (1.8%) 11.2 miles (4.7%)	14.2 minutes (5.2%) 8.1 miles (6.6%)
GMA-3	23.8 minutes (5.8%) 11.7 miles (9.3%)	14.7 minutes (8.9%) 8.5 miles (11.8%)
GMA-4	23.5 minutes (4.4%) 11.5 miles (7.5%)	14.4 minutes (6.7%) 8.3 miles (9.2%)
GMA-Low	23.2 minutes (3.1%) 11.4 miles (6.5%)	14.4 minutes (6.7%) 8.3 miles (9.2%)
GMA-High	23.4 minutes (4.0%) 11.5 miles (7.5%)	14.4 minutes (6.7%) 8.3 miles (9.2%)

Source: Unpublished data from the Southern California Association of Governments 1988.

Table 7-6. Vehicle Hours Traveled and Delay for 1984, Proposed Project, and Alternatives GMA-1, GMA-Low, and GMA-High

	Vehicle Hours Traveled (in 1,000s)	Vehicle Hours of Delay (in 1,000s)	Percent Delay
1984	6,343	629	10%
2010			
Proposed Project (GMA-4 Modified)	12,407	3,657	29%
Alternative			
GMA-1 (No Project)	19,575	10,132	52%
GMA-2	12,781	4,110	32%
GMA-Low	12,123	3,491	29%
GMA-High	16,511	6,720	41%

Source: Unpublished data from the Southern California Association of Governments 1988.

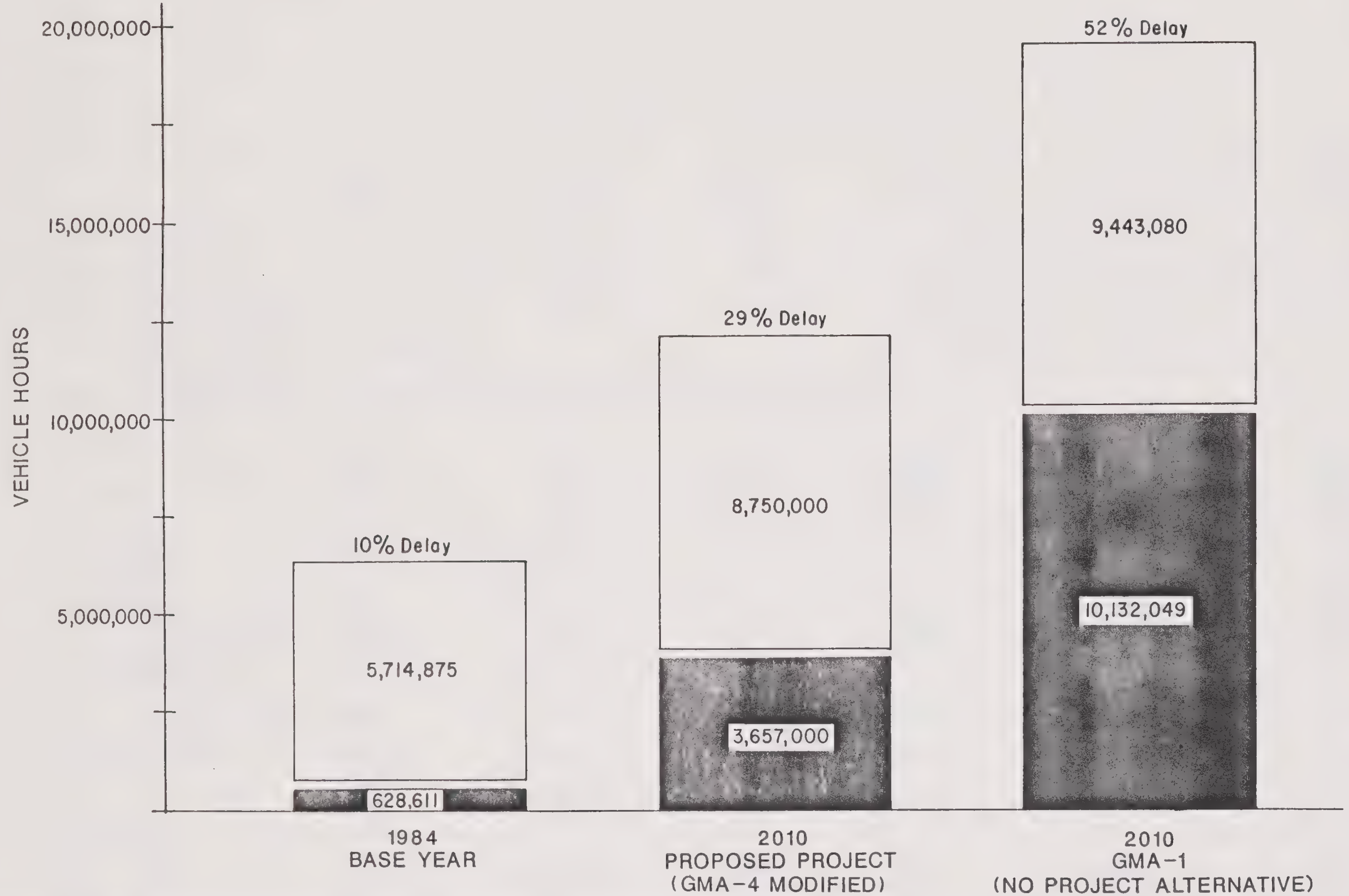


FIGURE 7-2. COMPARISON OF REGIONAL TRAVEL TIME & DELAY FOR 1984 BASE YEAR AND 2010 UNDER PROPOSED PROJECT (GMA-4 MODIFIED) AND GMA-1 (NO PROJECT ALTERNATIVE)

Table 7-7. Daily County and Regional Vehicle Miles Traveled (in Thousands) (and Percent Increase over the 1984 Base Year) for 1984, Proposed Project, and Alternatives GMA-1, GMA Low, and GMA-High

	Ventura County	Los Angeles County	Orange County	Riverside County	San Bernardino County	Regional Total[a]
1984	10,111	142,290	40,822	12,843	15,225	221,292
2010						
Proposed Project (GMA-4 Modified)	15,305	198,111	68,675	31,688	33,032	346,811
	(51%)	(39%)	(68%)	(147%)	(117%)	(57%)
Alternative						
GMA-1 (No Project)	15,559 (54%)	207,617 (46%)	79,705 (95%)	37,730 (194%)	35,576 (134%)	376,187 (70%)
GMA-2	N/A	N/A	N/A	N/A	N/A	342,766 (55%)
GMA-Low	15,103 (49%)	195,592 (37%)	68,164 (67%)	31,184 (143%)	32,471 (113%)	341,513 (55%)
GMA-High	16,846 (67%)	219,073 (54%)	75,947 (86%)	36,687 (185%)	38,560 (153%)	387,113 (75%)

Source: Unpublished data from the Southern California Association of Governments 1988.

[a] Totals may not add up due to rounding.

N/A = Not available.

Table 7-8. County and Regional Miles of Congestion for 1984, Proposed Project, and Alternatives GMA-1, GMA-Low, and GMA-High

	Ventura County	Los Angeles County	Orange County	Riverside County	San Bernardino County	Regional Total[a]
AM Peak 1984	1	162	55	2	2	221
2010 Proposed Project (GMA-4 Modified)	24	780	600	193	171	1,769
Alternative GMA-1 (No Project)	25	1,642	1,163	542	535	3,908
GMA-Low	23	726	581	179	163	1,671
GMA-High	39	1,331	979	380	341	3,070
PM Peak 1984	5	314	98	3	2	422
2010 Proposed Project (GMA-4 Modified)	50	1,401	1,035	306	250	3,042
Alternative GMA-1 (No Project)	44	2,276	1,926	691	617	5,553
GMA-Low	47	1,334	1,003	285	238	2,907
GMA-High	79	2,323	1,590	599	535	5,127

Source: Unpublished data from the Southern California Association of Governments 1988.

[a] Totals may not add up due to rounding.

Table 7-9. Regional Miles of Congestion by Facility Type (in Lane-Miles) for 1984, Proposed Project, and Alternatives GMA-1, GMA-Low, and GMA-High

		Freeways	Arterials	Secondaries
AM Peak	1984	136	73	12
	2010			
	Proposed Project (GMA-4 Modified)	735	908	126
	Alternative			
	GMA-1 (No Project)	1,249	2,326	333
	GMA-Low	705	845	121
	GMA-High	1,033	1,798	238
PM Peak	1984	231	158	33
	2010			
	Proposed Project (GMA-4 Modified)	1,285	1,539	219
	Alternative			
	GMA-1 (No Project)	1,855	3,244	454
	GMA-Low	1,249	1,449	209
	GMA-High	1,770	2,967	390

Source: Unpublished data from the Southern California Association of Governments 1988.

Table 7-10. Home-Work Transit Use Summary

	Mode	Passenger Trips (in 1,000s)	Passenger Miles (in 1,000s)	Passenger Hours (in 1,000s)	Miles per Trip	Passenger-Miles Per Route-Mile	Trips Per Vehicle-Mile
1984	RTD local	484	1,230	91	2.54	208.0	15
	RTD express	247	2,135	93	8.65	527.9	28
	Other local	67	179	13	2.66	66.9	16
	OCTD local	51	209	14	4.11	89.1	14
	Total	849	3,753	211	4.42*	250.6*	27*
2010 Proposed Project (GMA-4 Modified)	RTD local	471	1,066	82	2.26	179.5	31
	All express	244	1,987	84	8.14	518.9	29
	Other local	86	249	18	2.90	92.4	16
	OCTD local	68	312	20	4.59	130.2	18
	Rail	62	436	14	7.03	5,736.8	82
	Total	931	4,050	218	4.35*	271.2*	28*
Alternative GMA-1 (No Project	RTD local	468	1,070	82	2.28	180.1	30
	All express	252	2,194	91	8.70	573.1	30
	Other local	84	248	18	2.94	91.9	15
	OCTD local	72	341	22	4.74	142.5	19
	Rail	60	423	14	7.04	5,559.3	79
	Total	936	4,276	227	4.57*	286.3*	28*
GMA-Low	RTD local	468	1,059	82	2.26	178.4	30
	All express	241	1,970	83	8.17	514.5	29
	Other local	85	244	18	2.87	90.5	16
	OCTD local	68	308	20	4.53	128.5	18
	Rail	62	434	14	7.00	5,725.6	82
	Total	923	4,015	216	4.35*	268.8*	28*
GMA-High	RTD local	492	1,116	86	2.26	187.9	32
	All express	260	2,141	90	8.23	559.1	31
	Other local	94	275	20	2.92	102.0	17
	OCTD local	74	342	22	4.62	142.7	20
	Rail	65	455	15	7.00	6,002.6	86
	Total	984	4,329	233	4.40*	289.8*	30*

Source: Unpublished data from the Southern California Association of Governments 1988.

Notes: RTD = Rapid Transit District.
OCTD = Orange County Transit District.
Rail = Funded Century and Los Angeles-Long Beach light rail lines.
Totals may not add up due to rounding.
* Denotes regional average.

Port-Related Travel

Activity at the ports of Long Beach and Los Angeles also plays an important role in the region's transportation system, providing both another mode to accommodate the demand for travel, and creating demand for transport of the goods that flow through these facilities. Current estimates of port imports and exports indicate that approximately 65 percent of the tonnage flowing through the ports was destined for or originated in California. Assuming that 60 percent of the total traffic has an origin or destination in southern California, about 60 million of the 100 million tons of current throughput can be considered locally generated cargo. (Southern California Association of Governments 1987).

IMPACTS AND MITIGATION MEASURES

Impact Evaluation Criteria

For purposes of evaluating the transportation-related impacts of the proposed project and GMA-1, the level of congestion and amount of delay experienced in 1984 will be the threshold level for determining significance. Average trip length, hours of delay, percent delay, average speed, miles of congestion, and percent transit mode are used as critical performance indicators for the proposed project and GMA-1.

Other indicators of system performance will not be used to determine the significance of impacts, but will be presented for comparison purposes only. These other measures include daily person-trips, vehicle miles traveled, and the demand for airport and port facilities.

Future Transportation Facilities Network

The future roadway network represents the transportation system in 2010. The difference between the future network and the 1984 base network is the addition of projects programmed for funding in the 1984 State Transportation Improvement Program (STIP). Thus, the future network is referred to as the existing plus funded system. The analysis of the baseline growth projection (GMA-1) on the existing plus funded network, as presented in this chapter, is the No-Project Alternative.

As with the 1984 base network, the future network includes all of the state highways, freeways, expressways, and major arterials, as well as some important minor arterials and connector streets. Projects included as part of the existing plus funded network include construction of new facilities such as the 17.8-mile Century Freeway, the extension of I-15 as a six-lane freeway in Riverside County, the State Route (SR) 30 and SR 330 additions in San Bernardino County, and numerous road widenings and lane restripings. There are 628 additional lane-miles of freeway in the future network, compared to the 1984 base network.

The major additions to the 1984 transit network to produce the 2010 transit network include the Los Angeles-Long Beach and Century Freeway light rail lines. The number of lines of express bus service was reduced to eliminate duplicative lines in the corridors served by the light rail lines. The Metrorail project was not included in the existing plus funded network, because funding for that project was not finalized in the 1984 STIP.

Proposed Project

Impact: Significant Increase in Traffic Congestion Above 1984 Levels

By 2010, daily person-trips in the region are expected to total 57.3 million--42 percent more than in 1984 (Table 7-1). Home-work person-trips would grow to 10.3 million by 2010, maintaining an 18 percent proportion of total person-trips in the region (Table 7-2).

Los Angeles County would continue to have the greatest number of trips in the region, but its share would drop from 63 percent in 1984 to 56 percent in 2010. The drop in proportion of trips in Los Angeles County is offset by the growth in the share of trips in Riverside and San Bernardino Counties. Los Angeles County person-trips would increase by 6.7 million. The smallest increase would occur in Ventura County with a gain of 1.1 million person-trips.

Under the proposed project, the proportion of intracounty trips would be similar to existing conditions--89 percent in 1984 compared to 88 percent in 2010 (Table 7-3). A substantial amount of intercounty commuting would continue to be a major source of traffic congestion in the region. By 2010 the number of home-work trips from Riverside and San Bernardino Counties to Los Angeles County would increase 64 percent from 1984. Commuting between Riverside and San Bernardino Counties would more than double, and commuting from these two eastern counties to Orange County would nearly double (Table 7-4 and Figure 7-3).

Regionwide, the average trip length would increase from 7.6 miles and 13.5 minutes in 1984 to 8.2 miles and 14.3 minutes in 2010. This represents nearly an 8 percent increase in trip length. The average home-work trip length would also increase--from 10.7 miles and 22.5 minutes in the base year to 11.4 miles and 23.2 minutes in the future year. The difference in time and distance between home-work trips and all trips would be comparable to 1984--about 3 miles and 9 minutes (Table 7-5).

The number of hours of delayed travel in the region would increase dramatically. As shown in Table 7-6, 29 percent of the hours of travel in the region would be spent not moving at a free flow speed on the roadway, as compared to 10 percent in 1984.

The increased congestion on the region's transportation facilities would also be reflected in lower speeds. Future year speeds would be substantially lowered from 47 mph to 35 mph for freeways and from 35 mph to 28 mph for all facilities.

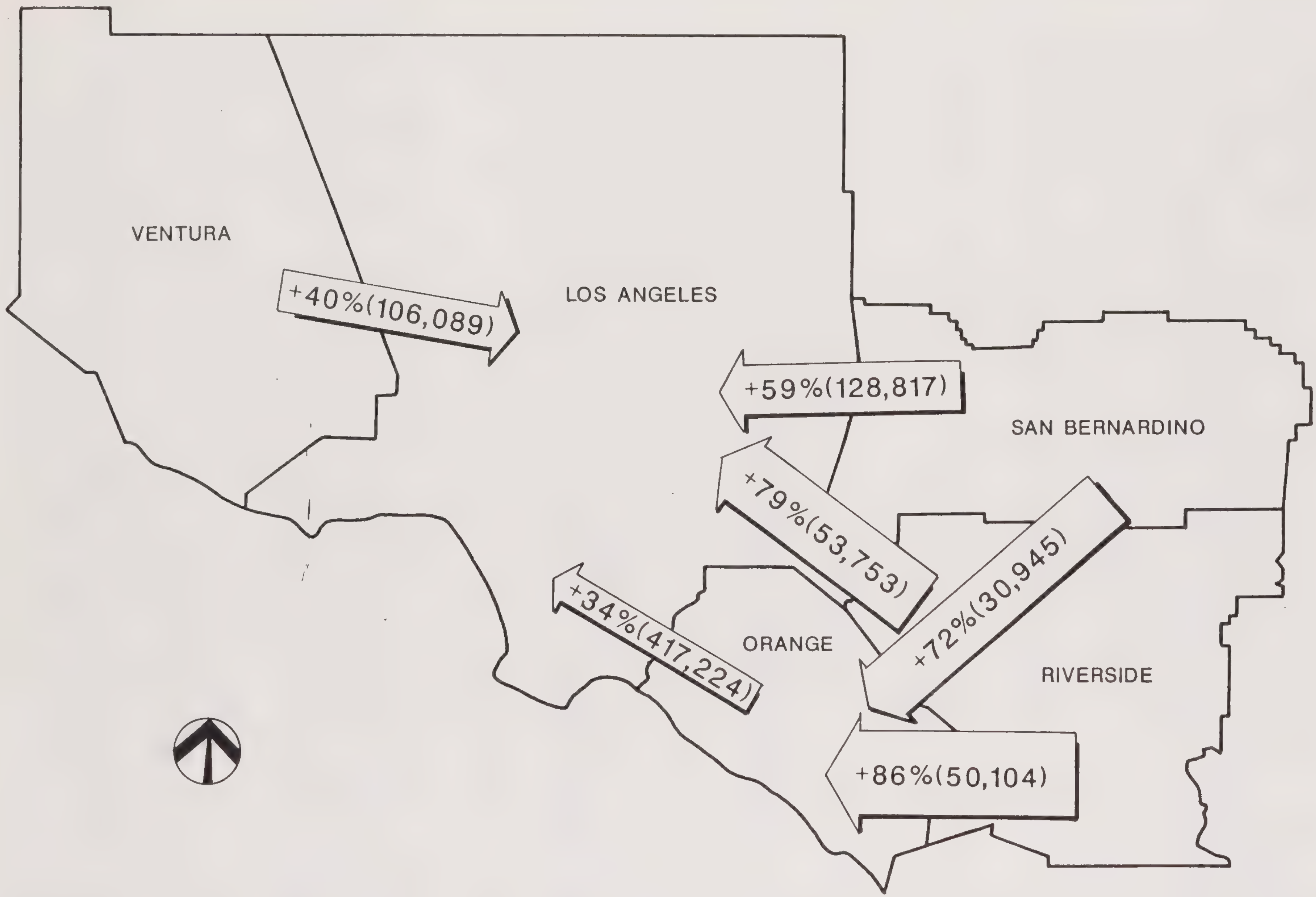


FIGURE 7-3. INCREASE IN INTER COUNTY HOME TO WORK TRIPS, 1984 TO 2010, FOR THE PROPOSED PROJECT (GMA-4 MODIFIED)

The region would also experience significant increases in VMTs. Total VMTs would rise 57 percent from the base year to 346.8 million. VMTs in Riverside and San Bernardino Counties would more than double (Table 7-7).

Even with the facility additions of the existing plus funded network, the number of miles of congestion would rise sharply. Over 3,000 miles of congestion would exist under pm peak period conditions in 2010, compared to only 422 in 1984. Under future peak conditions most of the congestion would occur on major arterials rather than freeways (Tables 7-8 and 7-9).

The limitations of future automobile travel are not well accommodated for by the projected transit use. Even with two new light rail lines, transit patronage is not expected to increase significantly. In fact, transit's mode split share would drop from 6.6 percent in 1984 to 5.1 percent in 2010 for the region. As shown in Table 7-10, total passenger trips would increase by less than 10 percent.

Key highway system performance indicators for 1984 and the proposed project are summarized in Table 7-11. Even with the assumed additions and improvements to the roadway system, traffic congestion would worsen significantly with the increased amount of travel expected from the proposed project. Mobility in the region would continue to become more and more restricted. This increased traffic congestion, as indicated by a longer average trip length, increased delay, lower speeds, increased miles of congestion, and a lower share for transit mode, is considered a significant impact. The following recommended mitigation strategy would not reduce the traffic congestion impact to a less-than-significant level; however, it would substantially alleviate much of the problem. Therefore, this impact is unavoidable.

Mitigation Measures

Introduction. A number of basic approaches have been meshed together to develop a strategy to mitigate the transportation-related impacts of the proposed project. These approaches include:

- o facility development,
- o J/H balance,
- o demand management, and
- o system management.

The facility development approach involves spending a large amount of money to maintain the physical integrity of the transportation system. This approach involves rehabilitation and maintenance of existing roads as well as construction of new freeways, local facilities, and rail lines.

The purpose of the J/H balance approach is to implement policies which make it easier for people to find employment opportunities near their homes and/or housing opportunities near their jobs, in hopes that much of the negative impacts of growth on the transportation system can be alleviated.

A demand management approach emphasizes changing driver behavior to lessen demands on the system. Programs which move drivers from the single-

Table 7-11. Comparison of System Performance Indicators for the Region

	1984	Proposed Project (GMA-4 Modified)		GMA-1 (No Project)		GMA-Low		GMA-High	
		Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Vehicle miles traveled (in 1,000s)	221,292	346,811	284,382	376,187	304,594	342,513	281,106	387,113	314,793
Vehicle hours traveled (in 1,000s)	6,343	12,407	7,850	19,575	8,556	12,123	7,726	16,511	9,080
Vehicle hours delay (in 1,000s)	629	3,657	899	10,132	1,300	3,491	865	6,720	1,360
Percent delay	10% (6 min./hr.)	29% (17 min./hr.)	11% (7 min./hr.)	52% (32 min./hr.)	15% (9 min./hr.)	29% (17 min./hr.)	11% (7 min./hr.)	41% (24 min./hr.)	15% (9 min./hr.)
Average speed (mph)									
All facilities	35	28	36	19	36	28	36	23	35
Freeways	47	35	45	24	42	35	45	30	43
Percent transit Mode (home-work)	6.6%	5.1%	19.4%	5.1%	19.4%	5.1%	19.5%	4.9%	19.8%
Miles of congestion (lane-miles)									
a.m.	221	1,769	149	3,908	299	1,671	141	3,070	275
p.m.	422	3,042	340	5,553	494	2,906	320	5,127	611

Source: Unpublished data from the Southern California Association of Governments 1988.

occupant mode to high-occupancy modes of travel effectively achieve the goal of this approach.

A system management approach ensures the most efficient use of both the existing and proposed roadway systems. It emphasizes methods for improving the existing system.

As part of the SCAG RMP development process, which is taking place in conjunction with the SCAG GMP, several preliminary mobility strategies were developed and tested using the SCAG transportation model. Four distinct strategies resulted from many months of analysis and testing. The strategies include the approaches described above in various combinations and with different emphases. A preferred strategy will be developed for the RMP from these strategies. The mitigation strategy presented below for the proposed project corresponds to the preferred RMP stragety of SCAG's preliminary draft of strategies which will be used to develop the RMP (Southern California Association of Governments 1988g).

The preferred RMP strategy was incorporated into the transportation model analysis using the socioeconomic data set associated with the proposed project. The strategy is composed mainly of J/H balance and demand management approaches to alleviate traffic congestion. It would improve the productivity and efficiency of the existing system to decrease demand and increase capacity in an economical way. Construction of new facilities would be limited to areas where increased transportation demand could not be met by other approaches.

Facility Development Actions. The preferred RMP strategy would require as few freeway widenings and as little new construction as possible to meet demand. Construction would include the I-710 gap closure between Los Angeles and Pasadena; the Century Freeway in Los Angeles County; State Route 30 in San Bernardino County; the I-15 Norco gap closure currently under construction in Riverside County; and the Eastern, Foothill,and San Joaquin corridors in Orange County. In total, the strategy calls for 875 lane-miles of new construction. An additional 983 lane-miles of high occupancy vehicle lane capacity would be constructed (Southern California Association of Governments 1988g).

Demand for an extensive rapid transit system is supported by the greatly increased transit ridership expected under the demand management portion of the strategy. Two commuter-rail lines, eleven heavy rail lines, and five light rail corridors, would be constructed, totalling 397 miles. In addition 112 supporting park-and-ride lots would also be constructed (Southern California Association of Governments 1988g).

Job/Housing Balance Actions. Methods to redirect job growth to job-poor subregions, through policy options, would include: exactions, environmental regulations, redevelopment enterprise zones, tax-revenue sharing, use of local police powers, infrastructure funding, location of new major public facilities, telecommunications, allocation of state and federal economic development funds, requirements for incorporation, industrial development bonds, and other more traditional economic development techniques. Methods to redirect housing growth to job-rich subregions through policy options would include: housing limitations, incentives, police power changes in job-

rich areas, exactions, redevelopment practices, infrastructure funding, housing development bonds, and zoning changes in job-poor subregions.

Through a combination of these policy options, 9 percent of job growth from job-rich areas could be transferred to job-poor areas, amounting to 360,000 jobs. About 4.5 percent of housing growth from housing-rich areas could be transferred to job-rich/housing-poor areas. This transfer would involve 350,000 people and 150,000 dwelling units anticipated under the proposed project (Southern California Association of Governments 1988g).

Demand Management Actions. The mitigation strategy would keep facility development to a minimum through an intense demand management program including: implementation of the South Coast Air Quality Management District's (SCAQMD) Regulation XV, modified work weeks, employment center carpool goals, increased transit work trips, and extended peak periods. The SCAQMD Regulation XV mandates increased participation by employers in rideshare programs. Its implementation is expected to shift 161,000 drive-alone trips to either transit or some other form of ridesharing. An additional 106,400 drive-alone trips would shift to carpooling through the mandatory achievement of ridesharing goals in 66 employment centers. A mandatory program of modified work weeks and telecommunications programs would eliminate another 3.1 million person-trips. A program to increase daily home-work transit trips by 940,000 supports the need for the proposed rapid transit corridors. Finally, extended peak periods would result in a 4-hour a.m. peak and a 6-hour p.m. peak (Southern California Association of Governments 1988g).

System Management Actions. This strategy also includes incident-response programs such as the "SMART Freeway" technology; CALLBOX service authorities for freeway emergencies; expansion of modal separation programs for rail, trucks, and bicycles; increased traffic flow improvement programs, including expanded ramp metering, high occupancy vehicle ramp-meter-bypass installations and synchronized signal programs; and expanded pavement management programs (Southern California Association of Governments 1988g).

The effectiveness of the preferred RMP strategy as mitigation for the proposed project is summarized according to the critical system performance indicators in Table 7-11. The strategy would be successful at reducing vehicle miles traveled from the level that would occur without mitigation It would also reduce hours of delay from 29 percent of each trip to 11 percent of each trip, which is very near the target of a maximum of 10 percent delay achieved in 1984. The most pronounced effect would be the 19.4 percent mode share that would be achieved for transit. This level of participation is not only significantly better than that which would occur under the proposed project scenario without mitigation, but it is also considerably above the 6.6 percent mode share for transit in the base year. The number of miles of congestion would also be reduced to a level better than which existed in 1984 with implementation of the mitigation strategy.

Air Travel

The increased demand for the region's airport facilities would match that of ground transportation facilities demand growth in terms of its dramatic impact. Passenger activity is expected to more than triple from 44.7 MAP in 1984 to 118.3 MAP in 2010 (Southern California Association of Governments 1988g). The pressures to expand or modify existing facilities and develop new ones would be tremendous. Solutions such as converting military facilities and constructing small airports on the urban fringes would have to be considered if this projected demand is to be accommodated.

Port-Related Travel

By 2010, locally generated cargo through the Ports of Long Beach and Los Angeles can be expected to increase 42 percent to 84.9 million tons annually. About half the cargo would be petroleum moving via pipelines to local refineries. The other half of the local cargo probably would be moved by trucks, producing an additional 4,148 truck trips per day. This truck traffic is in addition to congestion already projected for ground transportation near port areas (Southern California Association of Governments 1987).

GMA-1

Impact: Significant Increase in Traffic Congestion Above 1984 Levels

Under the GMA-1 alternative, daily person trips are expected to be 42 percent higher than in 1984, increasing to nearly 57 million trips (Table 7-1). Regionwide, 18 percent of the trips would be for home-work purposes, as was the case in 1984 (Table 7-2). The total number of home-work trips would increase 42 percent from 7.3 million in 1984 to 10.3 million in 2010.

Although Los Angeles County would still be the recipient of the greatest proportion of trips in the region, its share of person-trips would drop from 63 percent in the base year to 55 percent in 2010 under GMA-1. The proportion of trips occurring in Orange, Riverside, San Bernardino, and Ventura Counties would each increase slightly over the base year. Los Angeles County person-trips would experience the largest increase--up 6 million between 1984 and 2010. Riverside County, however, would show the most dramatic increase in total daily person-trips, with a more than doubling of person-trips from just under 2 million to 4.8 million.

The proportion of intracounty trips would decrease slightly from 89 percent in the base year to 86 percent under GMA-1, indicating a tendency for longer trip lengths (Table 7-3). As shown in Table 7-5, the average trip length would increase by 2.3 miles for home-work trips and by 1.6 miles for all trips.

Intercounty commuting would increase substantially under GMA-1 (Table 7-4). The greatest increase in trips would occur in the eastern counties of Riverside and San Bernardino. Figure 7-4 shows the effect of the increased population and employment on intercounty commuting. The baseline growth forecast projects a large influx of people to the eastern perimeter of the region, while the greatest growth in employment would occur in the urban

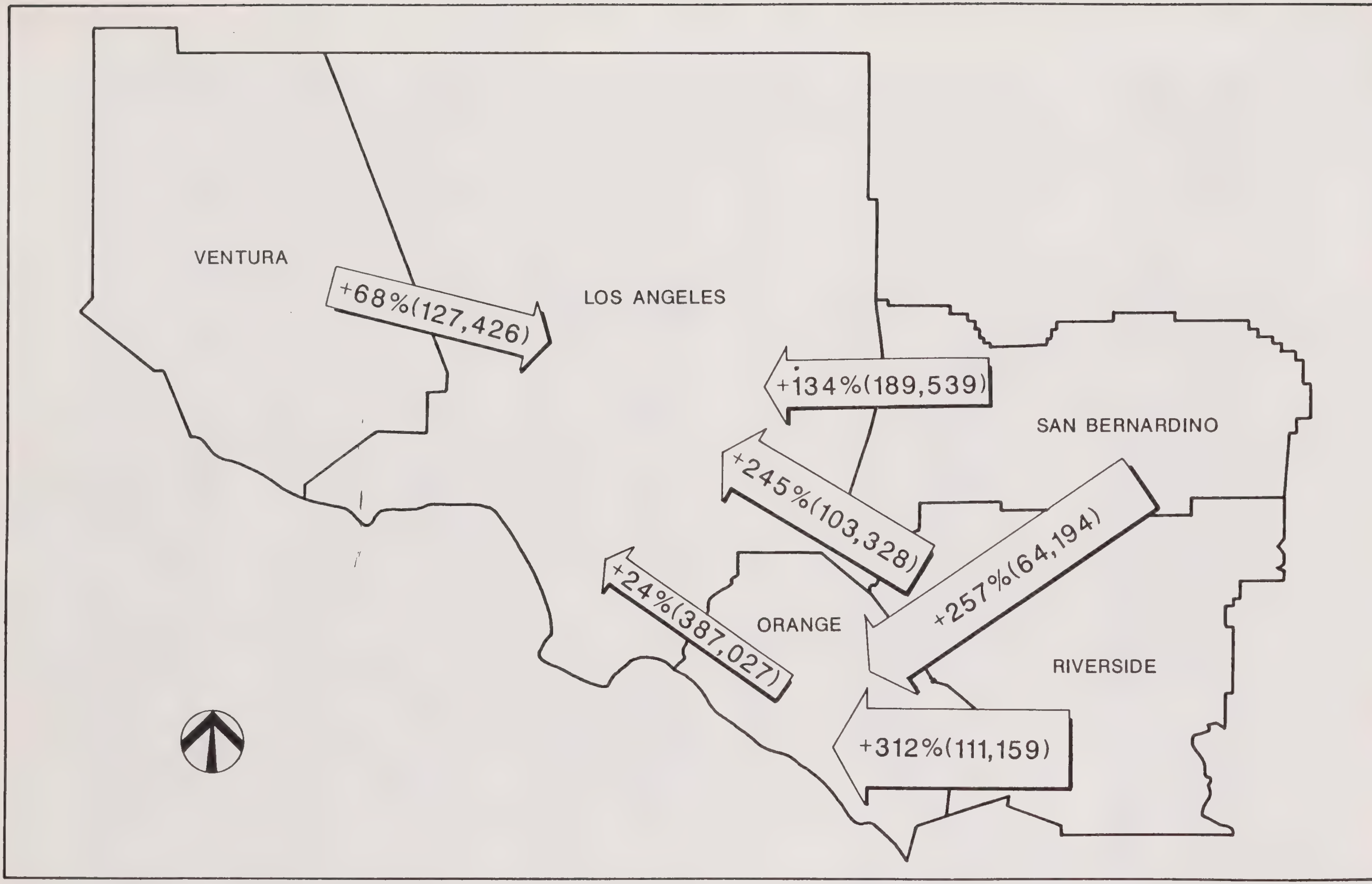


FIGURE 7-4. INCREASE IN INTER COUNTY HOME TO WORK TRIPS, 1984 TO 2010, FOR GMA-1 (NO PROJECT ALTERNATIVE)

centers of Orange and Los Angeles Counties, leading to a tremendous increase in home-work trips across county boundaries.

The longer average trip length and increased amount of intercounty commuting would lead to a tremendous growth in the amount of travel time spent in delay. Vehicle hours of delay would increase from 629,000 in 1984 to 10.1 million in 2010 under this alternative. This amount of delay would translate to an average of 52 percent of the time for each trip spent in delay. This is a significant increase from the 10 percent delay experienced under existing conditions (Table 7-6 and Figure 7-2).

Lower speeds would also result from the increased congestion. In fact, travel speeds would be roughly half what they were in 1984, falling to an average of 24 mph for freeways and 19 mph for all facilities. This speed reduction indicates a severe restriction to mobility.

The number of VMTs would increase as a result of increased demand due to population and employment growth and longer distance trips. Total VMTs would grow 54 percent by 2010 in the region to 376.2 million. San Bernardino and Riverside Counties would show the greatest percentage increases, with 134 percent and 194 percent more VMTs, respectively (Table 7-7).

This increased demand for transportation facilities would result in nearly 4,000 miles of congestion on the existing plus funded network during the a.m. peak period. GMA-1 would result in over 5,000 miles of congestion during the p.m. peak period. More than half of the congestion would occur in Los Angeles and Orange Counties (Table 7-8). A look at the congestion by facility type shows that most of the needs would be for arterials and freeways, especially during the p.m. peak period (Table 7-9).

Despite its potential, transit is projected to provide for only 5.1 percent of the trips under the GMA-1 scenario--slightly less than the 6.6 percent mode share achieved in 1984. As shown in Table 7-10, passenger trips would grow by only 10 percent in 25 years.

The critical highway system performance indicators for GMA-1 and 1984 are compared in Table 7-11. Significant deterioration in traffic operating conditions would occur regionwide under GMA-1, even with the assumed facility improvements of the future roadway network. The increased traffic congestion that would result from GMA-1, as indicated by a longer average trip length, increased delay, lower average speeds, increased number of miles of congestion, and a lower share for transit, is considered a significant adverse impact. The following recommended mitigation strategy would not reduce the traffic congestion impact to a less-than-significant level, however, it would substantially alleviate much of the problem. Therefore, this impact is unavoidable.

Mitigation Measures. As with the proposed project, a number of approaches have been meshed together to develop a mitigation strategy for GMA-1. The mitigation measure presented below corresponds to "Stragety 4" of SCAG's preliminary draft of strategies toward development of the Regional Mobility Plan (Southern California Association of Governments 1988g). These approaches used to develop Strategy 4 include:

- o facility development,
- o demand management, and
- o system management.

The strategy combines improved productivity and efficiency of the existing system with facility development to meet the remaining mobility needs. This strategy achieves mobility objectives by emphasizing an extensive demand management program and facility improvements to complete the system.

Facility Development Actions. Due to the absence of a J/H balance program, there is a great need for freeway improvements in the GMA-1 mitigation strategy, particularly east-west corridors. New freeway corridor construction includes the I-710 gap closure, the Century Freeway, Route 2, Route 30, Route 39, Route 64, Route 71, Route 90, and the Route 170 extension in Los Angeles County. In Orange county the new corridors include Route 39, Route 55 extenstion, Route 57 extension, Route 73 extension, Route 90, and the Eastern and Foothill corridors. Riverside County construction would include the I-15 Norco gap closure and Route 71. San Bernardino County construction includes Route 30 and Route 71, and Ventura County includes only the Route 23/Route 118 connection. In total, 1,687 lane-miles of freeway system improvements would be constructed. An extensive high occupancy vehicle lane system needed to support the demand management portions of the strategy would create an additional 1,079 lane-miles of freeway (Southern California Association of Governments 1988g).

Nine heavy rail rapid transit corridors and seven light rail corridors are recommended in the strategy in order to meet the increased transit demand resulting from the demand management program. The absence of a J/H balance or other growth management component for this strategy results in transit demand along all the major east-west freeways linking the urbanized portions of San Bernardino and Riverside Counties with central Los Angeles and Orange County. As a result, two commuter rail lines are included in the strategy. A total of 498.6 miles would be added to the rapid transit system under this strategy. (Southern California Association of Governments 1988g).

Demand Management Actions. An intense demand management program is recommended to keep the expensive facility development portion of the strategy to a minimum through implementation of the SCAQMD Regulation XV, modified work weeks, employment center carpool goals, increased transit work trips, and extended peak periods. The implementation of SCAQMD Regulation XV is expected to shift 137,600 drive-alone trips to either transit or some other form of ridesharing. An additional 102,700 drive-alone trips would shift to carpooling through the mandatory achievement of ridesharing goals in 66 employment centers. A mandatory program of modified work weeks and telecommunications programs would eliminate another 3.1 million person-trips. A program to increase daily home-work transit trips by 869,000 supports the need for the proposed rapid transit corridors. Finally, extended peak periods would result in a 4-hour a.m. peak and a 6-hour p.m. peak (Southern California Association of Governments 1988g).

System Management Actions. The strategy also includes incident-response programs such as the "SMART Freeway" technology; CALLBOX service authorities for freeway emergencies; expansion of modal separation programs for rail, trucks, and bicycles; increased traffic flow improvements programs including expanded ramp metering, high occupancy vehicle ramp-

meter-bypass installations and synchronized signal programs; and expanded pavement management programs (Southern California Association of Governments 1988g).

The effectiveness of the mitigation strategy described above for GMA-1 is summarized according to the critical system performance indicators in Table 7-11. The strategy is successful at reducing vehicle miles traveled and reducing hours of delay from 52 percent of each trip to 15 percent of each trip, which is slightly above the target of 10 percent that occurred in the base year. The most pronounced effect is the 19.4 percent mode share that would be achieved for transit. This participation is not only significantly better than that which would occur under GMA-1 without mitigation, but it is also considerably above the 6.6 percent mode share for transit in the base year. The number of miles of congestion would be substantially reduced to 299 for the a.m. peak period and 494 miles for the p.m. peak period, which is only slightly worse than base year conditions.

Air and Port-Related Travel

The future growth in demand for airport and port facilities would be the same for GMA-1 as for the proposed project.

Comparison of GMA-1 to Proposed Project

The analysis presented above has compared future traffic conditions of the proposed project and GMA-1 to 1984 base year conditions. The following analysis focuses on a comparison of these two conditions to each other.

Although the impacts of both scenarios are significant, compared to the proposed project, GMA-1 would produce transportation impacts of substantially greater magnitude. In terms of person-trips generated on a daily basis, the two alternatives are nearly equal. However, those trips would translate to far more VMTs under GMA-1 than for the proposed project. This is because there is no J/H balance element to GMA-1, resulting in more intercounty commuting, particularly from San Bernardino, Riverside, and Ventura Counties to Los Angeles and Orange Counties. This imbalance of jobs and housing under GMA-1 would also cause average speeds to be lower than for the proposed project and delay to be much worse. Under GMA-1 the percent of travel time spent in delay would be 52 percent compared to only 29 percent for the proposed project. The share of trips accounted for by transit would be equal for both scenarios--5.1 percent (Table 7-11).

The mitigated scenarios for both alternatives differ substantially also. Although delay, travel speeds, and transit mode share would all be comparable in terms of system performance, the reduction in actual VMTs and vehicle hours traveled would be more effective with the mitigated proposed project scenario than with the mitigated GMA-1 scenario. This is because the mitigation strategy for the proposed project has a strong J/H balance component coupled with demand management programs to decrease the demand for roadway capacity. The mitigation strategy for GMA-1 emphasizes a facilities construction approach, rather than demand reduction (Figure 7-5). Both mitigation strategies effectively work toward enhancing mobility in the

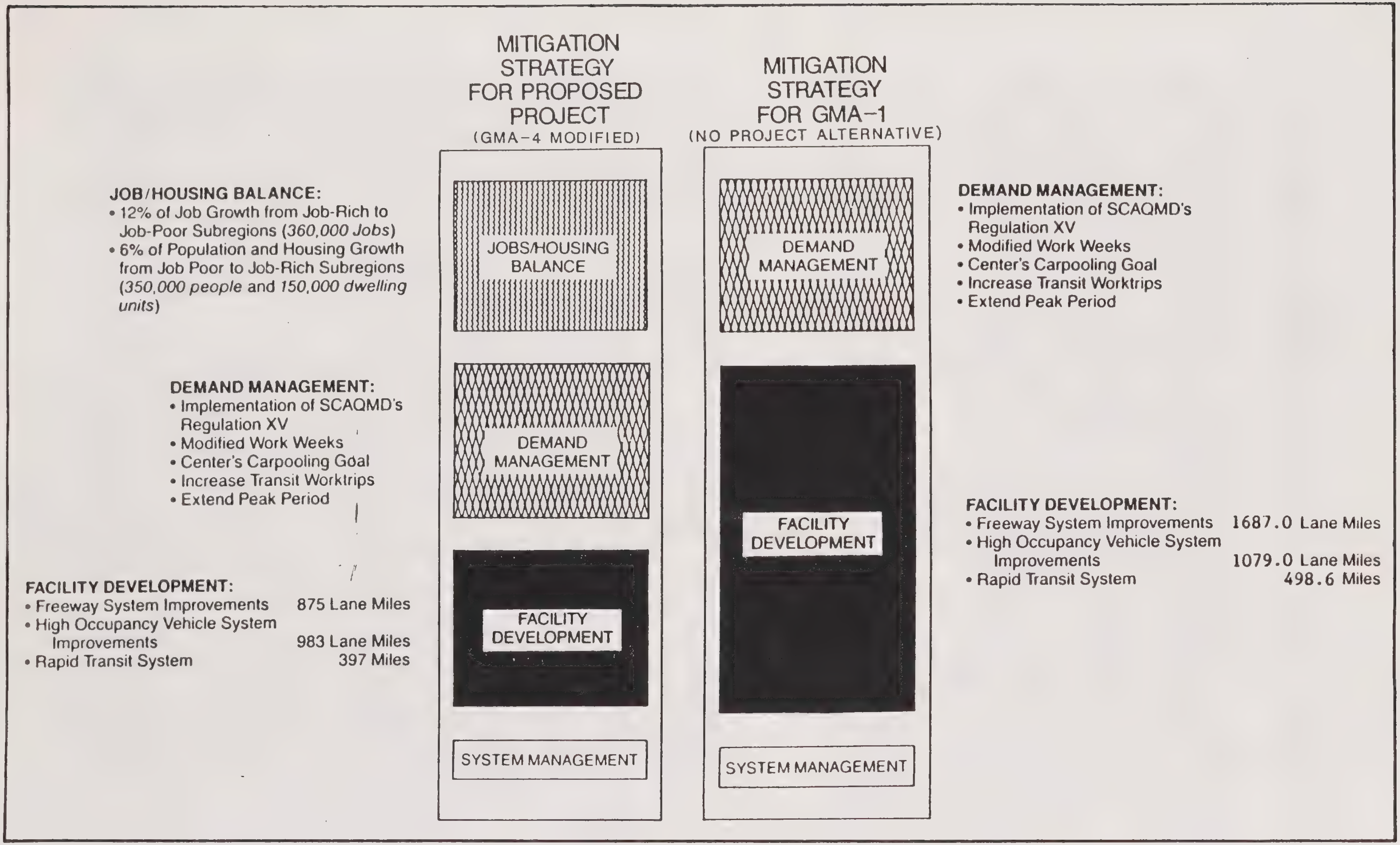


FIGURE 7-5. COMPONENTS OF MITIGATION STRATEGIES FOR THE PROPOSED PROJECT (GMA-4 MODIFIED) AND GMA-1 (NO PROJECT ALTERNATIVE)

region, even if neither strategy completely achieves the 1984 level of system performance.

Even though both mitigated scenarios would create a much better transportation environment in terms of mobility and level of sevice than the unmitigated alternatives, the lower VMTs and vehicle hours traveled that would occur under the mitigated proposed project scenario has more beneficial potential in terms of on-going system maintenance and air quality impacts.

The proposed project mitigation (Strategy 3) clearly includes less freeway widenings and less new freeway construction than the GMA-1 mitigation strategy (Strategy 4). What demands are reduced through J/H balance in the Strategy 3 are accommodated for through facilities construction in Strategy 4. Both strategies include only moderately extensive HOV and rail system construction elements. Very extensive HOV systems would not be needed because of the high transit ridership resulting from the demand management programs.

One important additional difference between the two mitigation strategies would be in their implementation and operating costs. Strategy 4 would have 34 percent higher capital costs and 7 percent higher operating costs than Strategy 3. Each mitigation strategy would include a financial program for raising funds necessary to implement all of the components. Cost estimates have been compared with revenues projected to be available from existing federal, state, and local sources for the two strategies, and shortfalls for each have already been identified (Southern California Association of Governments 1988g).

Three basic approaches to financing the mitigation strategies have been prioritized. General-taxation based financing would involve traditional gas tax revenues. In value-capture based financing an effort would be made to recoup a portion of the benefits that accrue to the private sector from the transportation improvement, such as benefit assessment fees and development impact fees. User-based approaches to financing involve charging users directly for the facility in use. Example include toll financing of highways and bridges and transit fares. Both of the mitigation strategies proposed in this analysis would rely chiefly on user-based financing, with some value-capture and general-taxation based approaches making up a small portion (Southern California Association of Governments 1988g).

Since SCAG has no authority at the local level, most elements of Strategies 3 and 4 would have to be carried out and enforced by the local governing authorities. The strategies provide an understanding of the level of investment that would be needed to achieve the transportation operating conditions that existed in 1984.

GMA-2

Under GMA-2, the total number of person-trips and home-work trips that would be generated daily in the region would each be 43 percent higher than in 1984 (Tables 7-1 and 7-2). The proportion of intracounty travel would be about the same as it was in 1984, both regionwide and within counties. In

1984, 89 percent of home-work person-trips had both origin and destination in the same county. In 2010, 88 percent of home-work trips would be for intracounty travel (Table 7-3). The distribution of intercounty commuting would also be similar to what occurred in the base year (Table 7-4). Because of the effect of the J/H balance emphasis of GMA-2, the average trip length would also be comparable to what it was in 1984. The home-work trip length would increase by less than one minute in terms of time, and by less than a mile in terms of distantce (Table 7-5).

In comparing two future year conditions, GMA-2 and the proposed project would both produce similar impacts. The similarities in person-trips generated, the amount of intracounty travel, the distribution of intercounty commuting, and trip lengths can be attributed to the common emphasis on a J/H balance approach for these two alternatives (Tables 7-1 through 7-5). In terms of VMT increases on a regional basis, GMA-2 is slightly better than the proposed project (Table 7-7), but less beneficial in terms of vehicle hours traveled and vehicle hours of delay (Table 7-6).

Although, regionwide, GMA-2 and GMA-1 would each generate about the same number of person-trips, the patterns of travel within and between counties would differ since GMA-1 does not include a J/H balance approach. San Bernardino and Riverside Counties would show slightly more of an increase in intracounty trips under GMA-2 than under GMA-1. Commuting between counties would be less under GMA-2 than GMA-1; far fewer trips from Riverside County to Los Angeles and Orange Counties would occur under GMA-2. The reduced amount of intercounty travel under GMA-2 would also be reflected in much shorter trip lengths than under GMA-1 (Tables 7-1 through 7-5).

GMA-3

Under GMA-3, the total number of person-trips that would be generated daily in the region would be 41 percent higher, and home-work trips would be 40 percent higher than in 1984 (Tables 7-1 and 7-2). The proportion of intracounty and intercounty travel would be about the same under GMA-3 as it was in 1984, both regionwide and within counties (Tables 7-3 and 7-4). The average trip length would also be slightly longer compared to what it was in the base year (Table 7-5).

GMA-3 differs from the proposed project in that a smaller share of trips would be generated in Orange County. That difference would be made up by more growth in San Bernardino and Riverside Counties, keeping the regionwide growth similar between these two alternatives (Tables 7-1 and 7-2). This shift in trip generation under GMA-3 reflects more controlled growth in Orange County. The travel within counties also reflects this local planning preference. The growth in intracounty trips for Orange County would be smaller in proportion to that occurring in other counties under GMA-3, compared to the proposed project (Table 7-3). However, there would still be a great deal of travel between Orange County and other counties under GMA-3 (Table 7-4). Travel times and trip lengths would be similar under GMA-3 and the proposed project (Table 7-5).

Regionwide GMA-3 and GMA-1 would each generate about the same number of person-trips, but GMA-1 does not allow for local planning preferences, so the patterns of travel within and between counties would differ.

GMA-4

Total daily person-trips and home-work trips would each be 42 percent higher in 2010 under GMA-4 than in 1984 (Tables 7-1 and 7-2). The proportion that intracounty trips would be of total trips for the region and for each county is similar between the GMA-4 scenario and 1984 conditions (Table 7-3). The amount of intercounty travel would increase substantially from baseline conditions, causing a slight increase in average trip length (Tables 7-4 and 7-5).

The impacts of GMA-4 would be quite different from the proposed project because GMA-4 projects more growth in Imperial County and the mountain and desert regions of Ventura, San Bernardino, and Riverside Counties than the other alternatives. This growth is only barely reflected in the transportation figures for Ventura County, but does not show up for the other areas, which are not included in the SCAG transportation modeling region (Tables 7-1 and 7-2). Intracounty trip-making patterns would be the same for GMA- 4 as for the proposed project; however, intercounty commuting would be significantly higher for GMA-4 than for the proposed project (Tables 7-3 and 7-4). In terms of trip length, GMA-4 would be very similar to the proposed project (Table 7-5).

The differences in Ventura County for GMA-4 are especially evident when it is compared to GMA-1, which merely perpetuates the growth trends of the 1970s and early 1980s. A shift toward growth in the rural areas is not represented in most of the data from the SCAG transportation model, except for in the person-trip generation figures for Ventura County. Ventura County shows a 54 percent growth in person-trips from 1984 to 2010 under GMA-4; for GMA-1 the increase would be only 48 percent (Table 7-1). A similar, but not as pronounced, comparison can be made for home-work trips (Table 7-2). Regionwide intracounty trips are very close for GMA-4 and GMA-1, but they would be slightly higher under GMA-4 for Riverside and San Bernardino Counties than under GMA-1 (Table 7-3). The increase in intercounty commuting under GMA-4 would be less than what would occur under GMA-1, and trip lengths would be slightly shorter (Tables 7-4 and 7-5).

GMA-Low

Comparison of GMA-Low to 1984 Conditions

Under GMA-Low, 2010 total daily person-trips in the region would number 56.2 million, representing a 40-percent growth rate in trips since 1984 (Table 7-1). Home-work trips would increase by 39 percent to 10.1 million (Table 7-2). Home-work trips would account for 18 percent of all trips, which is the same proportion that exists for the base year.

The proportion of intracounty trips would be 87 percent in 2010, only slightly lower than the 89 percent share for 1984 (Table 7-3). The greatest amount of intercounty commuting would continue to be from San Bernardino and Orange Counties to Los Angeles County. A tremendous increase in the number of intercounty trips from Riverside County to San Bernardino County would occur between 1984 and 2010 (Table 7-4).

Regionwide, the average trip length would increase by 0.7 mile and by slightly less than 1 minute (Table 7-5).

The number of hours of delayed travel in the region would increase substantially. As shown in Table 7-6, 29 percent of the hours of travel in the region would be spent not moving at a free flow speed on the roadway. In 1984, only 10 percent of travel time was spent in delay.

The increased congestion on the region's transportation facilities would also be reflected in lower travel speeds. Compared to the base year, future year speeds would be reduced from 47 mph to 35 mph for freeways and from 35 mph to 28 mph for all facilities.

The region would also experience significant increases in VMTs. Total VMTs would grow by 55 percent from the base year to 342.5 million (Table 7-7). VMTs in Riverside and San Bernardino Counties would more than double.

The increase in VMTs is reflected in the number of miles of congestion that would occur in 2010. During the a.m. peak period, more than 1,600 miles of congestion would exist, compared to 221 miles in 1984. As expected, the p.m. peak period would be even worse, with 5,127 miles of congestion estimated for 2010, compared to 422 miles of congestion in 1984 (Table 7-8). Under future year conditions, most of the congestion would occur on major arterials rather than freeways (Table 7-9).

Transit use is not expected to keep pace with the growth in transportation facilities demand under GMA-Low (Table 7-10). Even with two additional light rail lines and expanded transit bus service, patronage is not expected to increase significantly. Transit's mode share would drop from 6.6 percent in 1984 to only 5.1 percent in 2010.

Key highway system performance indicators for 1984 and GMA-Low are summarized in Table 7-11. Even with planned improvements to the roadway system, traffic congestion would worsen significantly with the increased amount of traffic expected under GMA-Low. This increased traffic congestion and decreased mobility, as indicated by a longer average trip length, increased delay, lower speeds, increased number of miles of congestion, and a lower share for transit mode, is considered a significant impact. The following recommended mitigation strategy would not reduce the traffic congestion impact to a less-than-significant level; it would, however, substantially alleviate the problem. Therefore, this impact is unavoidable.

Mitigation Measures. The preferred RMP strategy, with its emphasis on J/H balance and demand management components, was analyzed to determine its effectiveness at alleviating impacts from GMA-Low.

The effectiveness of the preferred RMP strategy as mitigation for GMA-Low is summarized according to the critical system performance indicators in Table 7-11. The strategy would reduce VMTs and vehicle hours of delay substantially, although not enough to achieve the levels that occurred in 1984. Percent delay would be reduced from 29 percent to 11 percent, which is very near the target of 10 percent delay achieved in 1984. Transit mode share would improve dramatically from 5.1 percent to 19.5 percent, considerably above the 6.6 percent mode share of transit in 1984. The number of miles of congestion would also be reduced to a level better than that which existed in 1984 with implementation of the mitigation strategy.

Comparison of GMA-Low to the Proposed Project

GMA-Low would generate fewer person-trips on a daily basis than the proposed project (56.2 million compared to 57.3 million). The proportionate share of trips generated by each county would be approximately the same for each of these two future year scenarios (Tables 7-1 and 7-2). The 8.9 million intracounty trips generated under GMA-Low, which account for 87 percent of all trips in the region, also would be similar in proportion to those projected under the proposed project (Table 7-3).

Except for trips from Orange County to Los Angeles County, intercounty travel would be slightly less under GMA-Low than for the proposed project (Table 7-4).

On a regionwide basis, trip lengths, average speed, and delay would be nearly identical for both scenarios (Table 7-5 and 7-6). This similarity is attributable to the strong J/H balance components of both scenarios.

Under GMA-Low, VMTs would increase 55 percent above existing conditions, slightly less than the growth of 57 percent that would occur with the proposed project (Table 7-7). Again, the similarity between these two scenarios is indicated by their respective miles of congestion, with GMA-Low showing slightly better conditions (Table 7-8 and 7-9).

GMA-Low also would result in slightly fewer transit trips than the proposed project.

Comparison of GMA-Low to GMA-1

Although the impacts of both scenarios are significant, compared to GMA-1, GMA-Low would produce transportation impacts of substantially less magnitude. GMA-Low would generate slightly fewer person trips (Tables 7-1 through 7-4). However, GMA-1 would result in a 70-percent increase in VMTs over 1984, whereas GMA-Low would result in a more moderate 55-percent increase over the base year (Table 7-7).

In addition, average trip lengths would be shorter for GMA-Low than for GMA-1 (Table 7-5). Regionwide, home-work trips would be 1 mile longer and take 1.6 minutes longer for GMA-1. Overall, this increase is reflected in the differing rates of delay for these two scenarios (Table 7-6). Under

GMA-Low, 19 percent of each trip would be spent in less than free flow traffic conditions, compared to 52 percent for GMA-1.

The number of miles of congestion that would occur under GMA-Low would be half that which would be expected under GMA-1 (Table 7-8). In both scenarios, more miles of arterial facilities would be congested than freeways (Table 7-9).

Transit patronage would be the same for GMA-Low and GMA-1.

GMA-High

Comparison of GMA-High to 1984 Conditions

Under GMA-High, daily person-trips are expected to be 57 percent higher than in 1984, increasing to 63.2 million trips (Table 7-1). Regionwide, 18 percent of the trips would be for home-work purposes, as was the case in 1984 (Table 7-2). The total number of home-work trips would also increase 57 percent, from 7.3 million in 1984 to 11.4 million in 2010.

Although the greatest number of trips would still be generated in Los Angeles County, the county's share of person-trips in the region would drop from 63 percent in 1984 to 55 percent in 2010 under GMA-High. Conversely, the proportion of trips generated in Orange, Riverside, San Bernardino, and Ventura Counties would each increase slightly over the base year.

The proportion of intracounty trips would be 87 percent in 2010, only slightly lower than the 89 percent share for 1984 (Table 7-3). Overall, intercounty commuting would increase throughout the region. The greatest amount of travel between counties would occur between Orange/San Bernardino Counties and Los Angeles County, and between Riverside and San Bernardino Counties (Table 7-4).

A longer average trip length and increased amount of intercounty commuting would also lead to a tremendous amount of travel time spent in delay (Tables 7-5 and 7-6). Vehicle hours of delay would increase from 629,000 in 1984 to 6.7 million in 2010 under this alternative. This amount of delay represents 41 percent of total travel time. In 1984, only 10 percent of each trip was spent in delay.

Lower speeds would also result from the increased congestion. Travel speeds would fall from 47 mph in 1984 to 30 mph in 2010 on freeways, and from 35 mph to 23 mph on the average for all facilities. These speed reductions would represent a severe restriction in mobility.

VMTs would increase greatly as a result of increased demand due to population and employment growth, more intercounty commuting, and longer trip distances (Table 7-7). Total VMTs would grow 75 percent by 2010 in the region to 387.1 million. Riverside County VMTs would nearly triple.

This increased demand for transportation facilities would result in 3,070 miles of congestion on the existing plus funded network during the a.m. peak

period (Table 7-8). GMA-High would result in 5,127 miles of congestion during the p.m. peak period. Three-fourths of the congestion would occur in Los Angeles and Orange Counties. A look at the congestion by facility type shows that most of the needs would be for arterial facilities (Table 7-9). Under base year conditions, most of the congestion occurred on freeways.

Transit is projected to provide for only 4.9 percent of the trips under GMA-High, slightly less than the 6.6-percent mode share achieved in 1984. As shown in Table 7-10, passenger trips would grow by 16 percent over the 25-year period.

The critical highway system performance indicators for GMA-High and 1984 are compared in Table 7-11. Significant deterioration in traffic operating conditions would occur regionwide under GMA-High, even with the assumed facility improvements of the future roadway network. The increased traffic congestion that would result from GMA-High, as indicated by a longer average trip length, increased delay, lower average speeds, increased number of miles of congestion, and a lower share for transit, is considered a significant impact. The following recommended mitigation strategy would not reduce the traffic congestion impact to a less-than-significant level; however, it would substantially alleviate much of the problem. Therefore, this impact is unavoidable.

Mitigation Measures. The preferred RMP strategy, with its emphasized J/H balance and demand management components, was analyzed to determine its effectiveness at alleviating impacts from GMA-High.

The effectiveness of the preferred RMP strategy as mitigation for GMA-High is summarized according to the critical system performance indicators in Table 7-11. The strategy would reduce VMTs and vehicle house of delay substantially, although not enough to achieve the levels that occurred in 1984. Percent delay would be reduced from 41 percent to 15 percent, which is above the 10 percent target that occurred in the base year. The most pronounced effect of the preferred RMP strategy with GMA-High would be the 19.8 percent mode share that would be achieved for transit. This level of patronage is not only significantly better than that which would occur under GMA-High without mitigation, but it is also considerably above the 6.6-percent mode share for transit in the base year.

Comparison of GMA-High to the Proposed Project

GMA-High would generate more person-trips on a daily basis than the proposed project (63.2 million compared to 57.3 million) (Table 7-1). The proportionate share of trips generated by each county would be about the same under GMA-High as for the proposed project. Both home-work total daily person-trips would grow by 57 percent from the base year under GMA-High. This increase compares to a 42-percent increase that would occur under the proposed project (Tables 7-1 and 7-2).

The 9.9 million intracounty trips that would be generated under GMA-High account for 87 percent of all trips in the region, which is similar to the proportion of intracounty travel for the proposed project (Table 7-3).

Travel between counties would be significantly greater with GMA-High than with the proposed project (Table 7-4). Most of the intercounty trips would be between Orange and Los Angeles Counties.

On a regional basis, average trip length would differ by only 0.1 mile between GMA-High and the proposed project (Table 7-5). The average trip distance is similar because both scenarios include J/H balance components.

Daily VMTs, however, would be much greater under GMA-High than under the proposed project (Table 7-7). This additional congestion is reflected in lower speeds, higher rates of delay, and a greater number of miles of congestion for GMA-High (Tables 7-6, 7-8, and 7-9).

A comparison of estimated transit patronage for each of these scenarios is shown in Table 7-10. Although a greater number of passenger trips is expected under GMA-High than under the proposed project, it is not enough to keep pace with the greater number of trips that would be generated by GMA-High. The transit mode share would be only 4.9 percent under GMA-High, compared to 5.1 percent under the proposed project.

Comparison of GMA-High to GMA-1

Although population and employment figures are predicted to be higher for GMA-High than for GMA-1, the transportation impacts of GMA-High would be less than those of GMA-1. The J/H balance element of the GMA-High scenario would result in less delay, higher speeds, and slightly fewer miles of congestion for GMA-High than for GMA-1 even though the actual number of person-trips generated and vehicle miles traveled would be greater for GMA-High (Tables 7-1, 7-2, 7-3, 7-6, 7-7, 7-8, and 7-9). The effect of the J/H balance component is also evident by the shorter trip lengths for GMA-High (Table 7-5).

Although both scenarios rate poorly in the transit patronage category, transit patronage would be slightly worse for GMA-High than for GMA-1.

CHAPTER 8. AIR QUALITY

SETTING

Air pollution is a major concern in southern California. It affects the health, well-being, and economy of the entire southern California population. Photochemical oxidants, ozone in particular, cause the most serious problems. Maximum ozone concentrations significantly exceed air quality standards. To reduce their exposure to ozone exceedances, residents and industries are requested periodically to curtail their activities. Other pollutants also exceed air quality standards to varying degrees with health-threatening effects.

The physical traits of the area make large areas of southern California particularly susceptible to smog. The geography; the warm, sunny climate; the lack of strong winds; and other meteorological conditions combine to form an environment conducive to the formation of air pollution. Despite southern California's long history of increasingly stringent controls on emissions from industry and motor vehicles, emissions continue to be generated at levels that prevent attainment of air quality standards.

Geophysical Conditions

Air Basins

The six-county SCAG region contains all or a part of three air basins: the South Coast Air Basin (SCAB), the Ventura County Air Pollution Control District portion of the South Central Coast Air Basin, and the Southeast Desert Air Basin. Figure 8-1 shows the boundaries of these areas.

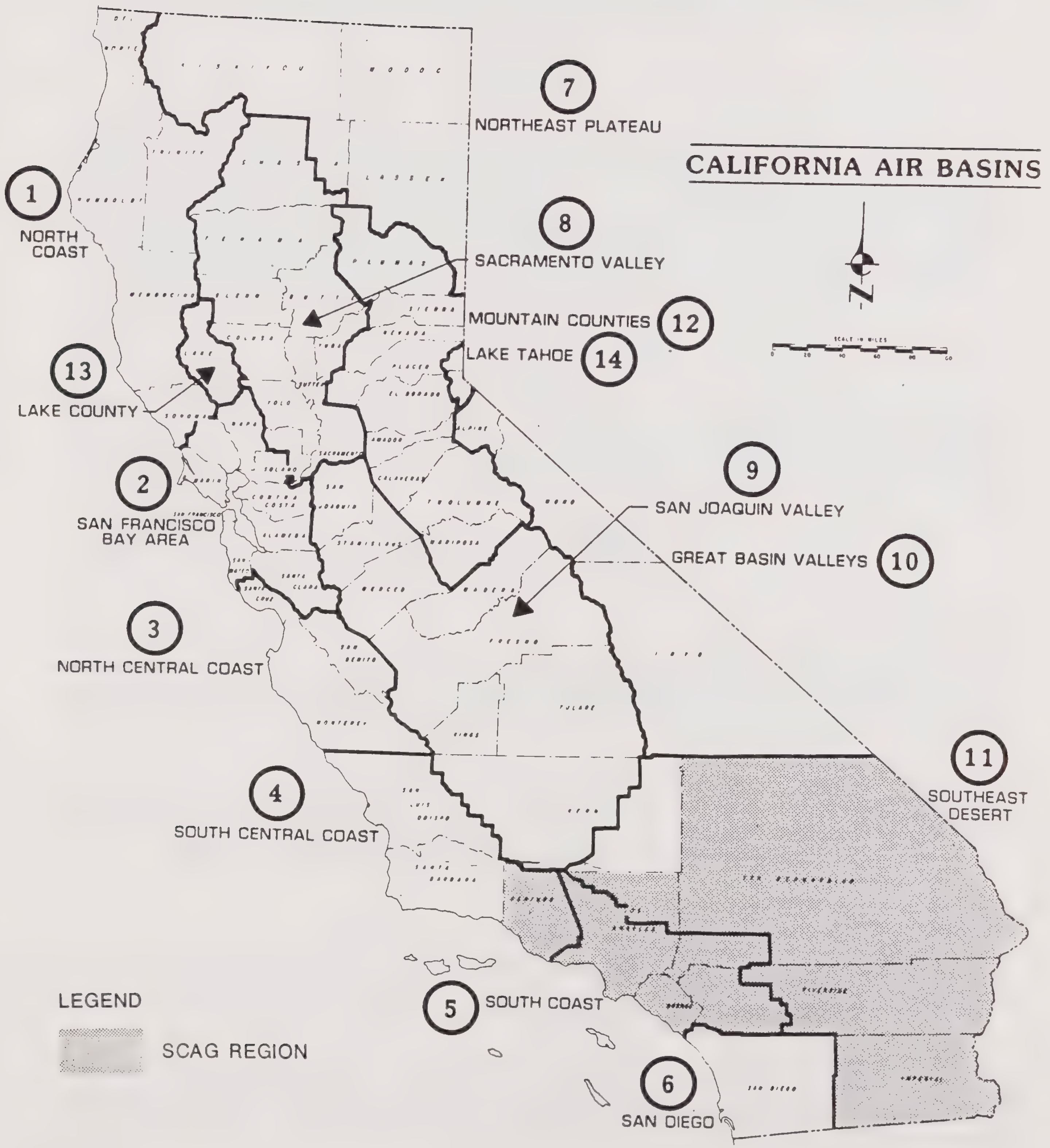
To address the area of greatest concern, the analysis presented in this EIR focuses on the SCAB. The SCAB includes Los Angeles County south of the crest of the San Gabriel Mountains, all of Orange County, and those parts of Riverside and San Bernardino Counties west of Banning Pass.

Meteorological and Topographic Conditions

Meteorological and topographic features of the SCAB combine to create conditions favorable to the formation of air pollution. During much of the year, the SCAB has a limited capability for dispersing pollutants.

The dominant wind pattern in the SCAB is a daytime sea breeze and a nighttime land breeze. The pattern is broken only by occasional winter storms and infrequent northeasterly Santa Ana winds from the mountains and desert area.

FIGURE 8-1



CALIFORNIA AIR BASINS
1
NORTH COAST
2
SAN FRANCISCO BAY AREA
3
NORTH CENTRAL COAST
4
SOUTH CENTRAL COAST
5
SOUTH COAST
6
SAN DIEGO
7
NORTHEAST PLATEAU
8
SACRAMENTO VALLEY
9
SAN JOAQUIN VALLEY
10
GREAT BASIN VALLEYS
11
SOUTHEAST DESERT
12
MOUNTAIN COUNTIES
13
LAKE COUNTY
14
LAKE TAHOE
N
LEGEND
SCAG REGION

During spring and early summer, much of the pollution produced in the SCAB is dispersed. The pollutants are either pushed through mountain passes by the strong ocean breezes or are dispersed aloft by warm vertical currents produced by solar heating of mountain slopes (a chimney effect). However, from late summer through winter, the dispersal is much less pronounced. Lower wind speeds and the occurrence of land breezes earlier in the day reduce horizontal dispersion. Pollutants thus remain in the basin overnight and accumulate over multiple days.

The vertical dispersion of air pollutants in the basin is reduced by temperature inversions in the atmosphere near the ground surface. Pollutants are prevented from rising through the inversion layer and become increasingly concentrated. A combination of low wind speeds and low inversion layers creates conditions that produce high concentrations of pollutants.

Institutional Conditions

Air Quality Planning

The federal Clean Air Act established air quality standards for several pollutants and requires areas that violate these standards to prepare and implement plans to achieve the standards by certain deadlines.

The deadline for attaining both the ozone and carbon monoxide (CO) standards was December 31, 1987. Neither of these two standards was achieved by the deadline. The failure to attain the standards by the deadline was expected.

The 1982 revision to the South Coast Air Basin Air Quality Management Plan (AQMP) (South Coast Air Quality Management District and Southern California Association of Governments 1982a) was adopted by the South Coast Air Quality Management District (SCAQMD) and SCAG, but was not approved by the U. S. Environmental Protection Agency. The 1982 revision to the plan, developed by the SCAQMD and SCAG, recommended control measures that would result in the attainment of some, but not all, of the air quality standards. Recently, the 1982 AQMP was vacated by the courts for failure to demonstrate attainment. EPA has been ordered by the court to develop a Federal Implementation Plan (FIP).

The 1988 Draft AQMP and Draft AQMP EIR were both released for review in September 1988 and are expected to be adopted later this year. This plan, once approved by ARB, will be the cornerstone of the FIP.

Air Quality Standards

Both the State of California and the federal government have established a variety of ambient air quality standards. State and federal air quality standards are shown in Table 8-1. By definition, all state standards are stricter than the federal standards.

Table 8-1

Ambient Air Quality Standards Applicable In California

			Standard, as parts per million		Standard, as micrograms per cubic meter		Violation Criteria	
Pollutant	Symbol	Averaging Time	California	National	California	National	California	National
Ozone	O3	1 hour	0.09	0.12	180	235	if exceeded	if exceeded on more than 3 days in 3 years
Carbon Monoxide	CO	8 hours	9.0	9	10,000	10,000	if exceeded	if exceeded on more than one day per year
		1 hour	20	35	23,000	40,000		
(Lake Tahoe only)		8 hours	6	---	7,000	---		
Nitrogen Dioxide	NO2	annual average	---	0.05	---	100	if equaled or exceeded	if exceeded
		1 hour	0.25	---	470	---		
Sulfur Dioxide	SO2	annual average	---	0.03	---	80	if exceeded	if exceeded
		24 hours	0.05	0.14	131	365		if exceeded on more than one day per year
		1 hour	0.25	---	655	---		
Hydrogen Sulfide	H2S	1 hour	0.03	---	42	---	if equaled or exceeded	
Vinyl Chloride	C2H3Cl	24 hours	0.010	---	26	---	if equaled or exceeded	
Particulate Matter, 10 microns or less	PM10	annual geometric mean	---	---	30	50	if exceeded	if exceeded
		24 hours	---	---	50	150		if exceeded on more than one day per year
Sulfate Particles	SO4	24 hours	---	---	25	---	if equaled or exceeded	
Lead Particles	Pb	calendar quarter	---	---	---	1.5	if equaled or exceeded	if exceeded on more than one day per year
		30 days	---	---	1.5	---		

Notes: All standards are based on measurements at 25° C and 1 atmosphere pressure.
National standards shown are the primary (health effects) standards.
The California 24-hour standard for SO2 applies only when state O3 or PM10 standards are being violated concurrently.

Source: Jones & Stokes Associates

The state 1-hour ozone standard is 0.10 ppm (part per million, by volume), not to be equaled or exceeded. The federal 1-hour ozone standard is 0.12 ppm, not to be exceeded more than three times in any 3-year period.

State and federal CO standards have been set for both 1-hour and 8-hour averaging times. The state 1-hour CO standard is 20 ppm, while the federal 1-hour CO standard is 35 ppm. Both state and federal standards are 9 ppm for the 8-hour averaging period. State CO standards are phrased as values not to be exceeded. Federal CO standards are phrased as values not to be exceeded more than once per year.

The state 1-hour nitrogen dioxide (NO_2) standard is 0.25 ppm, not to be equaled or exceeded. The federal annual average NO_2 standard is 0.05 ppm, not to be exceeded.

The state 1-hour sulfur dioxide (SO_2) standard is 0.25 ppm, and the state 24-hour standard is 0.05 ppm. Both state standards are phrased as values not to be exceeded. The federal annual average SO_2 standard is 0.03 ppm, not to be exceeded. The federal 24-hour SO_2 standard is 0.14 ppm, not to be exceeded more than once per year.

The state annual geometric mean inhalable particulate matter (PM10 or particulate matter having an effective aerodynamic diameter of 10 microns or less) standard is 30 micrograms per cubic meter ($\mu g/m^3$), and the state 24-hour standard is 50 $\mu g/m^3$. Both state standards are phrased as values not to be exceeded. The federal annual geometric mean PM10 standard is 50 $\mu g/m^3$, not to be exceeded. The federal 24-hour PM10 standard is 150 $\mu g/m^3$ not to be exceeded more than once per year.

Pollutants

Description of Pollutants

Ozone. Ozone, the main component of photochemical smog, is primarily a summer and fall pollution problem. It is a colorless gas that creates eye irritation, damages lung tissue, reduces resistance to colds and pneumonia, and aggravates chronic heart disease, asthma, bronchitis, and emphysema. Ozone also damages agricultural crops and corrodes material such as rubber and paint.

Ozone is not emitted directly into the air but is formed through a complex series of chemical reactions involving other compounds that are emitted directly. The directly emitted pollutants involved in this reaction are hydrocarbons (HC) and nitrogen oxides (NOx). HC are sometimes measured as reactive organic gases (ROG). These directly emitted pollutants are known as precursors. The time periods required for these reactions allows the reacting compounds to be spread over a large area, producing a regional pollution problem. Ozone problems are the cumulative result of regional development patterns, not the result of a few significant emission sources.

Carbon Monoxide. CO is primarily a winter pollution problem. Motor vehicle emissions are the dominant source of CO in most areas. As a directly

emitted pollutant, CO is transported away from the emission source accompanied by dispersion and reduced pollutant concentrations. Consequently, CO problems are usually localized, often the result of a combination of high traffic volumes and significant traffic congestion.

Outdoor CO levels are a fairly reliable indicator of potential indoor CO levels. CO is not chemically reactive and is poorly soluble in water. Thus, it is not adsorbed onto surfaces or otherwise removed from outdoor air entering a building through open doorways, open windows, or building ventilation systems.

CO levels are a public health concern because CO combines readily with hemoglobin and thus reduces the amount of oxygen transported in the bloodstream. Relatively low concentrations of CO can significantly affect the amount of oxygen in the bloodstream since CO binds to hemoglobin 220-245 times more strongly than does oxygen. Both the cardiovascular system and the central nervous system can be affected when 2.5-4.0 percent of the hemoglobin in the bloodstream is bound to CO rather than to oxygen. State and federal ambient air quality standards for CO have been set at levels intended to keep CO from combining with more than 1.5 percent of the blood's hemoglobin (U. S. Environmental Protection Agency 1979, California Air Resources Board 1982).

Nitrogen Dioxide. NO_2 is the principal component of the category of pollutants known as nitrogen oxides (NOx). By itself, NO_2 is a reddish brown toxic gas. It can increase the incidence of lung irritation, chronic bronchitis, and influenza. In conjunction with ROG, NO_2 is an ozone precursor. In the presence of moisture, it can form acidic compounds and cause acid deposition.

Sulfur Dioxide. SO_2 is the principal component of the category of pollutants described as sulfur oxides (SOx). SO_2 is a colorless gas with a pungent odor. It can react to form particulates, and, in the presence of moisture, it can form acidic compounds and cause acid deposition. SO_2 can irritate lung tissue, aggravate symptoms of heart and lung disease, and accelerate the corrosion of materials.

Particulate Matter. Particulate matter is composed of solid or liquid particles of dust, soot, aerosols, and other material. Recently, interest in particulate matter has shifted from total suspended particulates (TSP) to inhalable particulates. Inhalable particulate matter is commonly defined as having an effective aerodynamic diameter of 10 microns or less, resulting in the term PM10. It has been estimated that in the SCAB, 40 percent of PM10 emissions is composed of secondary aerosols (e.g., nitrates, sulfates, and organic compounds) (IPPS 1987).

Particulate matter aggravates chronic heart and lung disease, reduces visibility, and soils surfaces. In addition, particulate matter acts as a carrier, transporting toxic elements such as lead, cadmium, antimony, arsenic, nickel, vinyl chloride, asbestos, and benzene compounds, which then enter the respiratory, digestive, and lymphatic systems.

Monitoring Data

Measurements indicate that, for many pollutants, the SCAB experiences concentrations among the highest in the nation. Ozone violations in 1987 were five times greater in the SCAB than in any other part of the nation (U. S. Environmental Protection Agency 1988).

Tables 8-2 and 8-3 present ozone and CO monitoring data, respectively. These tables show that federal and state standards for these two pollutants have been consistently exceeded in the SCAB during the last 5 years. The federal ozone standard has on average been exceeded slightly fewer than half the days in a year. The state ozone standard, being more stringent, has been exceeded slightly more than half the days in a year.

The federal and state 8-hour CO standards have been exceeded slightly less than once every 5 days on average and exceedances are limited to Los Angeles and Orange Counties. The state 1-hour CO standard has been consistently exceeded in Los Angeles County and to a slight degree in Orange County. A measured exceedance of the federal 1-hour CO standard has not occurred in the SCAB during the last 5 years.

Table 8-4 shows that from 1982 to 1986, the state 1-hour NO_2 standard has been exceeded 9-18 days a year in Los Angeles County. The state 1-hour standard has been exceeded 1-4 days a year in Orange County from 1982 through 1985. The state 1-hour NO_2 standard was also exceeded once in 1983 in San Bernardino County. The federal annual average NO_2 standard was violated at individual monitoring stations in Los Angeles County every year from 1982 through 1986. Los Angeles County has been the only county in the state to experience violations of the federal annual average NO_2 standard.

As shown in Table 8-5, from 1982 through 1986, the state 1-hour SO_2 standard of 0.25 ppm and the state 24-hour SO_2 standard of 0.05 ppm were exceeded only once in the SCAB. This exceedance occurred in 1984 in Los Angeles County. From 1982 through 1986 no violations of the federal 24-hour standard of 0.14 ppm or the federal annual average standard of 0.03 ppm were recorded in the SCAB.

Air quality monitoring for PM10 has been reported only for the years 1984 through 1986. However, even these abbreviated data indicate exceedances of PM10 standards. As shown in Table 8-6, the state and federal 24-hour PM10 standards have been exceeded in the SCAB. The state 24-hour PM10 standards have been exceeded in all counties in the SCAB for the 3 reported years. The federal 24-hour PM10 standard has been exceeded in Los Angeles, Riverside, and San Bernardino Counties only during 1985 and 1986. No exceedances of the federal 24-hour standard were reported in 1984. The state annual geometric mean standard has been exceeded in all counties in the SCAB for the 3 reported years. The federal annual geometric mean standard was exceeded in Los Angeles, Riverside, and San Bernardino Counties only during 1985 and 1986, and exceeded in Orange County only in 1985. No exceedances of the federal annual geometric mean standard were reported in 1984.

Table 8-2.

Summary of South Coast Air Basin Ozone Monitoring Data

Location	Parameter	1982	1983	1984	1985	1986
Los Angeles County	Highest 1-hour Value	0.40	0.39	0.34	0.39	0.35
	Days Above Standard	142	146	153	171	159
Orange County	Highest 1-hour Value	0.32	0.3	0.32	0.34	0.25
	Days Above Standard	42	65	65	63	53
Riverside County	Highest 1-hour Value	0.35	0.36	0.32	0.35	0.27
	Days Above Standard	113	123	132	130	117
San Bernardino County	Highest 1-hour Value	0.32	0.39	0.34	0.34	0.31
	Days Above Standard	136	153	162	138	145
Entire Air Basin	Highest 1-hour Value	0.40	0.39	0.34	0.39	0.35
	Days Above Standard	151	153	175	174	164

Source: California Air Resources Board 1983 - 1987.

Note: All concentrations stated in parts per million.

"Standard" refers to the federal 1-hour standard of 0.12 parts per million.

Table 8-3.

Summary of South Coast Air Basin Carbon Monoxide Monitoring Data

Location	Parameter	1982	1983	1984	1985	1986
Los Angeles County	Highest 1-hour Value	27	31	29	33	27
	Highest 8-hour Value	21.3	20.9	19.7	27.7	19.7
	Days Above Standard	72	60	74	57	57
Orange County	Highest 1-hour Value	21	22	21	22	20
	Highest 8-hour Value	11.9	11.7	14.4	17	10.4
	Days Above Standard	12	8	6	8	4
Riverside County	Highest 1-hour Value	13	15	16	14	18
	Highest 8-hour Value	8.6	7.9	8.9	9.1	8.3
	Days Above Standard	0	0	0	1	0
San Bernardino County	Highest 1-hour Value	10	17	9	10	9
	Highest 8-hour Value	6.9	8.7	5.6	6.3	6.7
	Days Above Standard	0	0	0	0	0
Entire Air Basin	Highest 1-hour Value	27	31	29	33	27
	Highest 8-hour Value	21.3	20.9	19.7	27.7	19.7
	Days Above Standard	72	61	77	59	58

Source: California Air Resources Board 1983 - 1987.

Note: All concentrations stated in parts per million.

"Standard" refers to the federal and state 8-hour standard of 9 parts per million.

No violations of the federal 1-hour standard of 35 parts per million were measured.

Table 8-4.

Summary of South Coast Air Basin Nitrogen Dioxide Monitoring Data

Location	Parameter	1982	1983	1984	1985	1986
Los Angeles County	Highest 1-hour Value	0.41	0.47	0.35	0.35	0.33
	Days Above Standard	18	12	12	9	9
	Countywide Annual Mean	0.051	0.048	0.047	0.050	0.050
Orange County	Highest 1-hour Value	0.28	0.33	0.25	0.3	0.21
	Days Above Standard	1	4	2	2	0
	Countywide Annual Mean	0.042	0.039	0.039	0.037	0.038
Riverside County	Highest 1-hour Value	0.16	0.19	0.17	0.16	0.16
	Days Above Standard	0	0	0	0	0
	Countywide Annual Mean	0.032	0.034	0.035	0.035	0.032
San Bernardino County	Highest 1-hour Value	0.20	0.25	0.2	0.18	0.24
	Days Above Standard	0	1	0	0	0
	Countywide Annual Mean	0.041	0.037	0.039	0.038	0.042
Entire Air Basin	Highest 1-hour Value	0.41	0.47	0.35	0.35	0.33
	Days Above Standard	18	12	12	9	9
	Countywide Annual Mean	0.047	0.045	0.044	0.045	0.046

Source: California Air Resources Board 1983 - 1987.

Note: "Standard" refers to the state 1-hour standard of 0.25 parts per million.

The federal annual mean standard of 0.053 parts per million was exceeded at individual monitoring stations within Los Angeles county during all years shown.

All concentrations are stated in parts per million.

Table 8-5.

Summary of South Coast Air Basin Sulfur Dioxide Monitoring Data

Location	Parameter	1982	1983	1984	1985	1986
Los Angeles County	Highest 1-hour Value	0.09	0.12	0.32	0.08	0.13
	Hours Above Standard	0	0	1	0	0
	Highest 24-hour Value	0.036	0.042	0.055	0.035	0.039
	Days Above Standard	0	0	1	0	0
Orange County	Highest 1-hour Value	0.08	0.05	0.08	0.05	0.06
	Hours Above Standard	0	0	0	0	0
	Highest 24-hour Value	0.021	0.018	0.022	0.018	0.017
	Days Above Standard	0	0	0	0	0
Riverside County	Highest 1-hour Value	0.02	0.02	0.02	0.02	0.02
	Hours Above Standard	0	0	0	0	0
	Highest 24-hour Value	0.012	0.010	0.011	0.010	0.008
	Days Above Standard	0	0	0	0	0
San Bernardino County	Highest 1-hour Value	0.14	0.06	0.03	0.02	0.05
	Hours Above Standard	0	0	0	0	0
	Highest 24-hour Value	0.025	0.014	0.010	0.010	0.012
	Days Above Standard	0	0	0	0	0
Entire Air Basin	Highest 1-hour Value	0.14	0.12	0.32	0.08	0.13
	Hours Above Standard	0	0	1	0	0
	Highest 24-hour Value	0.036	0.042	0.055	0.035	0.039
	Days Above Standard	0	0	1	0	0

Source: California Air Resources Board 1983 - 1987.

Note: All concentrations are stated in parts per million.

"1-hour standard" refers to the state 1-hour standard of 0.25 parts per million.
"24-hour standard" refers to the state 24-hour standard of 0.05 parts per million.

No violations of the federal 24-hour standard of 0.14 parts per million or the federal annual average standard of 0.03 parts per million were measured.

Table 8-6.

Summary of South Coast Air Basin Inhalable Particulate (PM10) Monitoring Data

Location	Parameter	1982	1983	1984	1985	1986
Los Angeles County	Peak 24-hour value	NDA	NDA	135	165	211
	Days above 24-hour standard	NDA	NDA	0	1	2
	Annual geometric mean	NDA	NDA	41.8	66.7	55.4
Orange County	Peak 24-hour value	NDA	NDA	107	144	124
	Days above 24-hour standard	NDA	NDA	0	0	0
	Annual geometric mean	NDA	NDA	40.3	52.3	43.6
Riverside County	Peak 24-hour value	NDA	NDA	129	208	294
	Days above 24-hour standard	NDA	NDA	0	11	5
	Annual geometric mean	NDA	NDA	41.2	80.9	74.1
San Bernardino County	Peak 24-hour value	NDA	NDA	98	157	285
	Days above 24-hour standard	NDA	NDA	0	2	6
	Annual geometric mean	NDA	NDA	31.2	64.7	111.2
Entire Air Basin	Peak 24-hour value	NDA	NDA	135	208	294
	Days above 24-hour standard	NDA	NDA	0	11	8
	Annual geometric mean	NDA	NDA	41.8	80.9	111.2

Source: California Air Resources Board 1983 - 1987.

Note: All concentrations are stated in micrograms per cubic meter.

NDA: No data available. Reporting of PM10 monitoring data began in 1984.

24-hour standard refers to federal 24-hour standard of 150 micrograms per cubic meter.

Federal standard for annual geometric mean is 75 micrograms per cubic meter.

Annual geometric mean for highest monitoring station in county or air basin.

As a consequence of the recorded violations of the federal air quality standards, the SCAB has been designated a "nonattainment area" with respect to ozone, CO, NO_2, and particulates.

The standards described above are primary air quality standards, those levels of air quality necessary to protect public health with an adequate margin of safety. The nonattainment designation indicates that the level of air quality in the SCAB does not protect public health with an adequate margin of safety.

Emissions

Summary of Emissions Estimates. Tables 8-7 through 8-11 list the sources of emissions that contribute to air quality problems in the SCAB. Figures 8-2 through 8-6 graphically display the emissions estimates. The emissions estimates shown in these figures are aggregated into three categories: stationary sources, on-road vehicles, and other mobile sources.

In the SCAB, the two largest sources of ROG emissions are solvent use and on-road vehicles. In 1985, these two sources produced approximately 31 and 46 percent of the air basin total, respectively (Table 8-7 and Figure 8-2).

On-road vehicles produce the vast majority of CO emissions. In 1985, on-road vehicles produced approximately 88 percent of the air basin total (Table 8-8 and Figure 8-3).

The two largest sources of NOx emissions are stationary fuel combustion and on-road vehicles. These two sources produced approximately 24 and 60 percent of the air basin total, respectively. Mobile sources other than on-road vehicles produced approximately 13 percent of the total (Table 8-9 and Figure 8-4).

Four sources contribute significant amounts of SOx emissions. Fuel combustion contributed approximately 18 percent of the air basin total; petroleum processing, storage, and transfer contributed approximately 28 percent; on-road vehicles contributed approximately 35 percent; and other mobile sources contributed approximately 23 percent (Table 8-10 and Figure 8-5).

Road dust from paved and unpaved sources produce the vast majority of PM10 emissions. In 1985, this source produced approximately 78 percent of the air basin total (Table 8-11 and Figure 8-3).

Methodology for Emissions Estimates. The SCAB emissions inventory is compiled by the California Air Resources Board (ARB) and based on information received from several governmental agencies, including ARB, SCAQMD, Caltrans, SCAG, and special studies. The data are compiled in the Emissions Data System, which is the principal depository of emissions information for the entire state. SCAQMD has primary responsibility for analyzing information relevant to the SCAB.

Caltrans, ARB, and SCAG supply the data necessary to evaluate emissions from mobile sources. SCAG supplies a socioeconomic database that

Table 8-7. Reactive Organic Gas Emissions in the SCAB - Unmitigated GMA-1 (No Project Alternative)

Source Category	1985		2000		2010	
	tons/day	percent	tons/day	percent	tons/day	percent
Fuel Combustion	17.4	1.40%	22.6	2.22%	23.5	2.04%
Waste Burning	1.0	0.08%	1.2	0.12%	1.3	0.11%
Solvent Use	382.2	30.67%	430.5	42.23%	468.9	40.64%
Petroleum Process, Storage and Transfer	80.6	6.47%	77.2	7.57%	79.4	6.88%
Industrial Processes	24.1	1.94%	27.2	2.67%	28.6	2.48%
Pesticide Application and Farming Operations	49.6	3.98%	53.8	5.28%	56.4	4.89%
Road Dust From Paved and Unpaved Sources	0.0	0.00%	0.0	0.00%	0.0	0.00%
Miscellaneous Sources	35.6	2.86%	38.5	3.77%	40.9	3.54%
SUBTOTAL FOR STATIONARY SOURCES	590.5	47.38%	650.8	63.85%	699.0	60.58%
On-Road Vehicles	577.7	46.34%	256.9	25.20%	326.1	28.26%
Off-Road Vehicles	27.8	2.23%	41.5	4.07%	48.3	4.19%
Aircraft	15.0	1.21%	21.8	2.14%	25.4	2.20%
Other Mobile Sources	35.4	2.84%	48.3	4.73%	55.0	4.76%
SUBTOTAL FOR MOBILE SOURCES	655.9	52.62%	368.4	36.15%	454.8	39.42%
GRAND TOTAL FOR ALL SOURCES	1,246.4	100.00%	1,019.3	100.00%	1,153.8	100.00%

Source: South Coast Air Quality Management District 1988a and 1988b.

Table 8-8. Carbon Monoxide Emissions in the SCAB - Unmitigated GMA-1 (No Project Alternative)

Source Category	1985		2000		2010	
	tons/day	percent	tons/day	percent	tons/day	percent
Fuel Combustion	66.9	1.23%	108.5	2.79%	114.4	2.32%
Waste Burning	4.0	0.07%	4.4	0.11%	4.6	0.09%
Solvent Use	0.0	0.00%	0.0	0.00%	0.0	0.00%
Petroleum Process, Storage and Transfer	3.5	0.06%	4.0	0.10%	3.7	0.08%
Industrial Processes	5.5	0.10%	3.1	0.08%	3.3	0.07%
Pesticide Application and Farming Operations	0.0	0.00%	0.0	0.00%	0.0	0.00%
Road Dust From Paved and Unpaved Sources	0.0	0.00%	0.0	0.00%	0.0	0.00%
Miscellaneous Sources	110.7	2.04%	77.7	2.00%	78.9	1.60%
SUBTOTAL FOR STATIONARY SOURCES	190.6	3.51%	197.7	5.09%	205.0	4.16%
On-Road Vehicles	4,751.3	87.50%	3,005.8	77.36%	3,938.2	79.97%
Off-Road Vehicles	117.6	2.17%	172.0	4.43%	198.8	4.04%
Aircraft	68.9	1.27%	97.0	2.50%	112.0	2.27%
Other Mobile Sources	301.7	5.56%	412.9	10.63%	470.3	9.55%
SUBTOTAL FOR MOBILE SOURCES	5,239.5	96.49%	3,687.6	94.91%	4,719.3	95.84%
GRAND TOTAL FOR ALL SOURCES	5,430.1	100.00%	3,885.3	100.00%	4,924.3	100.00%

Source: South Coast Air Quality Management District 1988a and 1988b.

Table 8-9. Nitrogen Oxide Emissions in the SCAB - Unmitigated GMA-1 (No Project Alternative)

	1985		2000		2010	
Source Category	tons/day	percent	tons/day	percent	tons/day	percent
Fuel Combustion	254.3	24.45%	226.3	25.01%	241.3	23.35%
Waste Burning	0.7	0.07%	0.9	0.10%	1.0	0.10%
Solvent Use	0.1	0.01%	0.1	0.01%	0.1	0.01%
Petroleum Process, Storage and Transfer	9.8	0.94%	7.0	0.78%	7.3	0.70%
Industrial Processes	9.5	0.91%	6.5	0.71%	6.8	0.65%
Pesticide Application and Farming Operations	0.0	0.00%	0.0	0.00%	0.0	0.00%
Road Dust From Paved and Unpaved Sources	0.0	0.00%	0.0	0.00%	0.0	0.00%
Miscellaneous Sources	11.3	1.09%	13.5	1.50%	14.6	1.41%
SUBTOTAL FOR STATIONARY SOURCES	285.6	27.47%	254.3	28.11%	271.0	26.22%
On-Road Vehicles	619.0	59.53%	477.0	52.72%	570.3	55.18%
Off-Road Vehicles	11.0	1.06%	14.3	1.58%	15.7	1.52%
Aircraft	12.2	1.17%	16.0	1.77%	18.1	1.75%
Other Mobile Sources	112.0	10.77%	143.1	15.81%	158.4	15.33%
SUBTOTAL FOR MOBILE SOURCES	754.2	72.53%	650.4	71.89%	762.5	73.78%
GRAND TOTAL FOR ALL SOURCES	1,039.8	100.00%	904.7	100.00%	1,033.5	100.00%

Source: South Coast Air Quality Management District 1988a and 1988b.

Table 8-10. Sulfur Oxide Emissions in the SCAB - Unmitigated GMA-1 (No Project Alternative)

Source Category	1985		2000		2010	
	tons/day	percent	tons/day	percent	tons/day	percent
Fuel Combustion	18.2	15.00%	30.1	22.63%	31.4	22.27%
Waste Burning	0.8	0.66%	1.0	0.77%	1.1	0.81%
Solvent Use	0.0	0.00%	0.0	0.00%	0.0	0.00%
Petroleum Process, Storage and Transfer	27.5	22.69%	26.7	20.09%	27.4	19.49%
Industrial Processes	7.7	6.32%	8.3	6.22%	8.5	6.03%
Pesticide Application and Farming Operations	0.0	0.00%	0.0	0.00%	0.0	0.00%
Road Dust From Paved and Unpaved Sources	0.0	0.00%	0.0	0.00%	0.0	0.00%
Miscellaneous Sources	2.2	1.78%	2.7	2.00%	2.9	2.07%
SUBTOTAL FOR STATIONARY SOURCES	56.3	46.46%	68.8	51.72%	71.3	50.66%
On-Road Vehicles	34.7	28.66%	28.2	21.20%	31.1	22.08%
Off-Road Vehicles	1.3	1.06%	1.7	1.25%	1.8	1.29%
Aircraft	1.1	0.88%	1.4	1.08%	1.6	1.16%
Other Mobile Sources	27.8	22.94%	32.9	24.75%	34.9	24.81%
SUBTOTAL FOR MOBILE SOURCES	64.9	53.54%	64.2	48.28%	69.5	49.34%
GRAND TOTAL FOR ALL SOURCES	121.1	100.00%	132.9	100.00%	140.8	100.00%

Source: South Coast Air Quality Management District 1988a and 1988b.

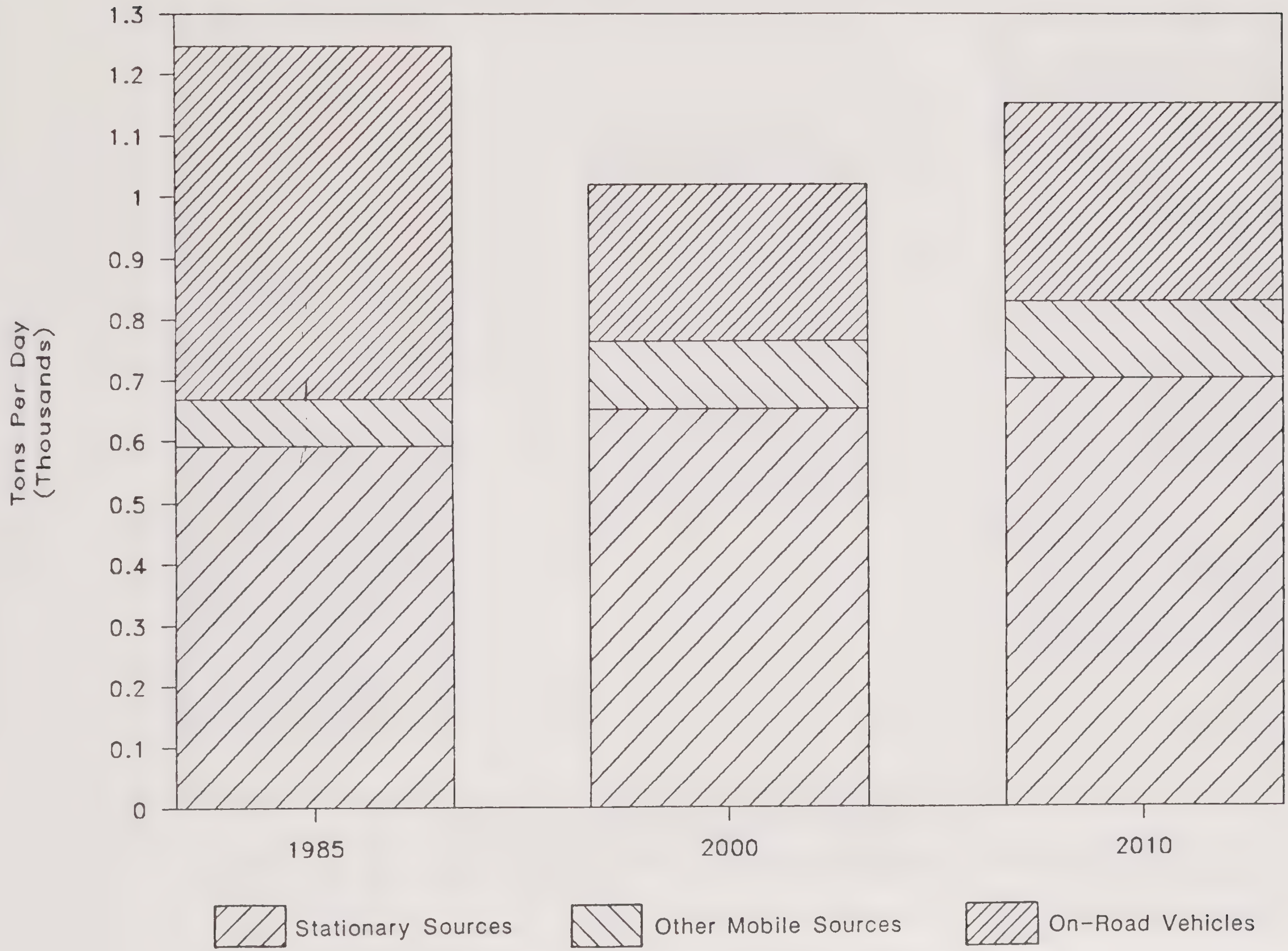
Table 8-11. Inhalable Particulate Matter (PM10) Emissions in the SCAB
Unmitigated GMA-1 (No Project Alternative)

Source Category	1985		2000		2010	
	tons/day	percent	tons/day	percent	tons/day	percent
Fuel Combustion	10.3	1.39%	15.2	1.54%	16.0	1.48%
Waste Burning	1.0	0.13%	1.1	0.11%	1.2	0.11%
Solvent Use	0.8	0.10%	0.9	0.10%	1.0	0.09%
Petroleum Process, Storage and Transfer	2.6	0.35%	2.7	0.27%	2.7	0.25%
Industrial Processes	11.7	1.58%	12.2	1.24%	12.9	1.20%
Pesticide Application and Farming Operations	4.9	0.65%	5.0	0.51%	5.2	0.48%
Road Dust From Paved and Unpaved Sources	507.3	68.49%	705.8	71.44%	764.2	70.93%
Miscellaneous Sources	140.3	18.94%	182.8	18.50%	203.8	18.92%
SUBTOTAL FOR STATIONARY SOURCES	678.7	91.64%	925.8	93.70%	1,007.0	93.47%
On-Road Vehicles	49.8	6.73%	47.9	4.84%	54.5	5.06%
Off-Road Vehicles	0.8	0.11%	1.0	0.10%	1.1	0.10%
Aircraft	0.7	0.09%	0.9	0.10%	1.1	0.10%
Other Mobile Sources	10.7	1.44%	12.5	1.27%	13.7	1.27%
SUBTOTAL FOR MOBILE SOURCES	62.0	8.36%	62.3	6.30%	70.4	6.53%
GRAND TOTAL FOR ALL SOURCES	740.7	100.00%	988.0	100.00%	1,077.4	100.00%

Source: South Coast Air Quality Management District 1988c.

Figure 8-2. Reactive Organic Gases

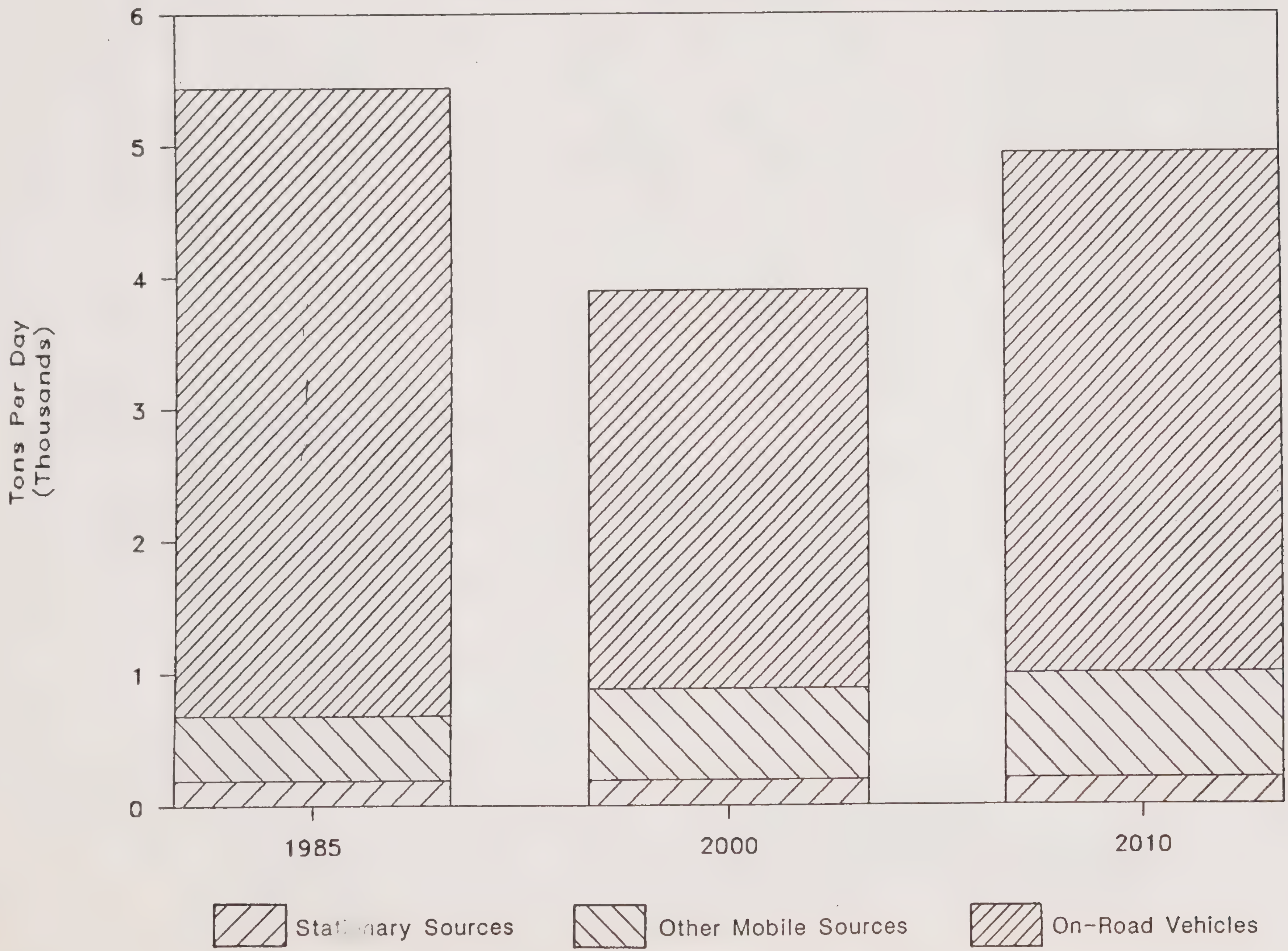
UNMITIGATED GMA-1 (NO PROJECT ALTERNATIVE)



Source: South Coast Air Quality Management District 1988a and 1988b.

Figure 8-3. Carbon Monoxide Emissions

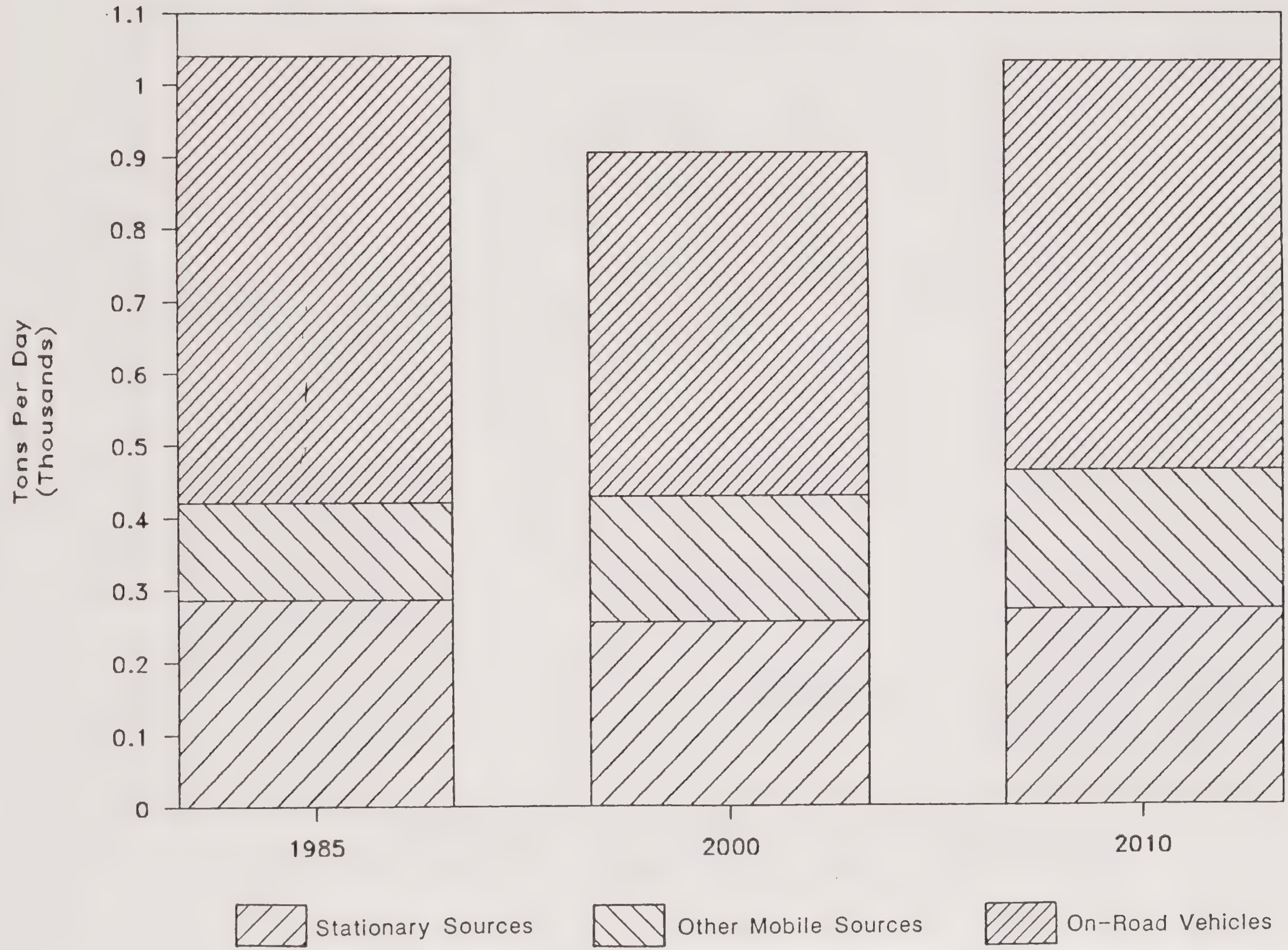
UNMITIGATED GMA-1 (NO PROJECT ALTERNATIVE)



Source: South Coast Air Quality Management District 1988a and 1988b.

Figure 8-4. Nitrogen Oxide Emissions

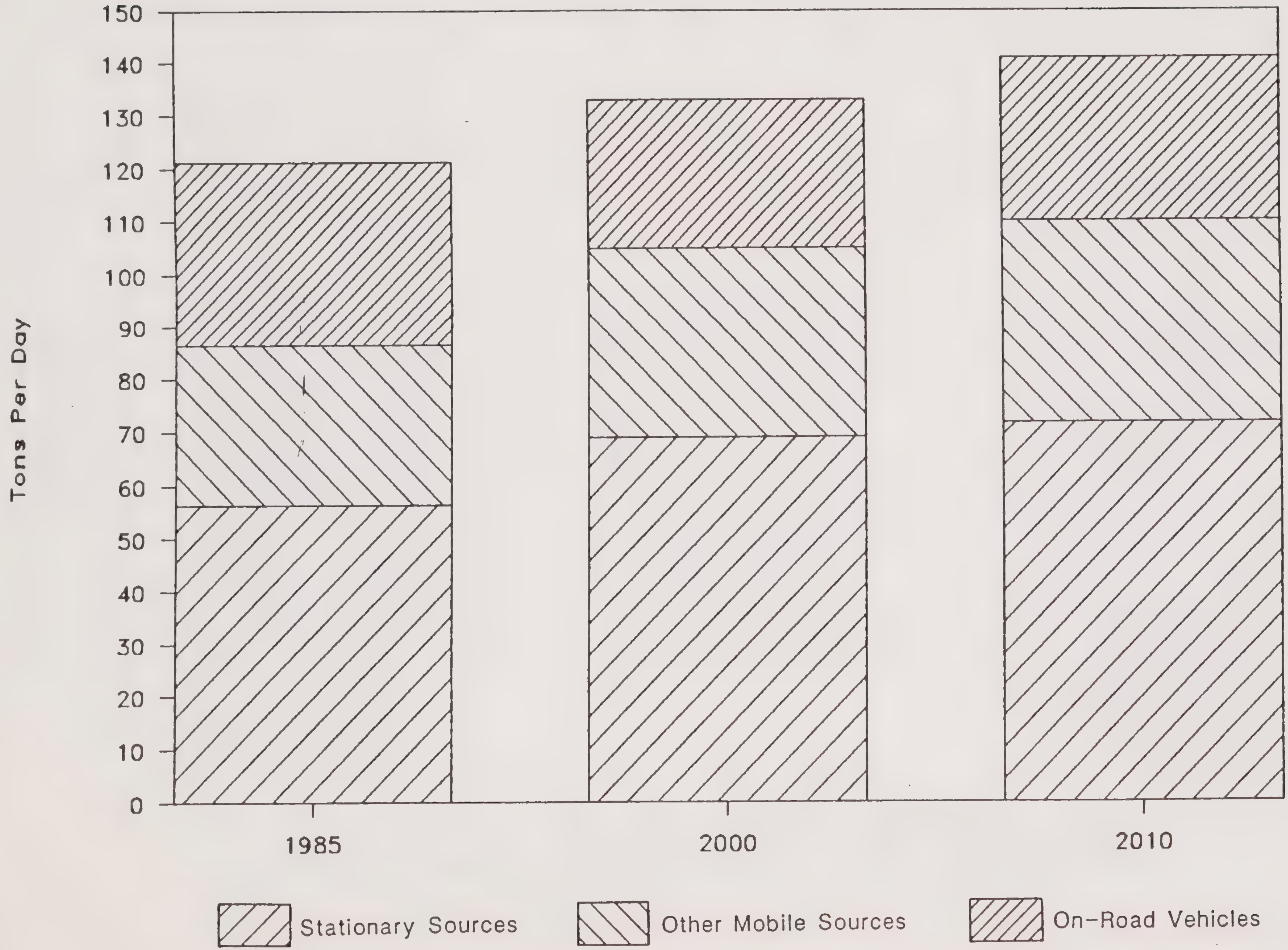
UNMITIGATED GMA-1 (NO PROJECT ALTERNATIVE)



Source: South Coast Air Quality Management District 1988a and 1988b.

Figure 8-5. Sulfur Oxide Emissions

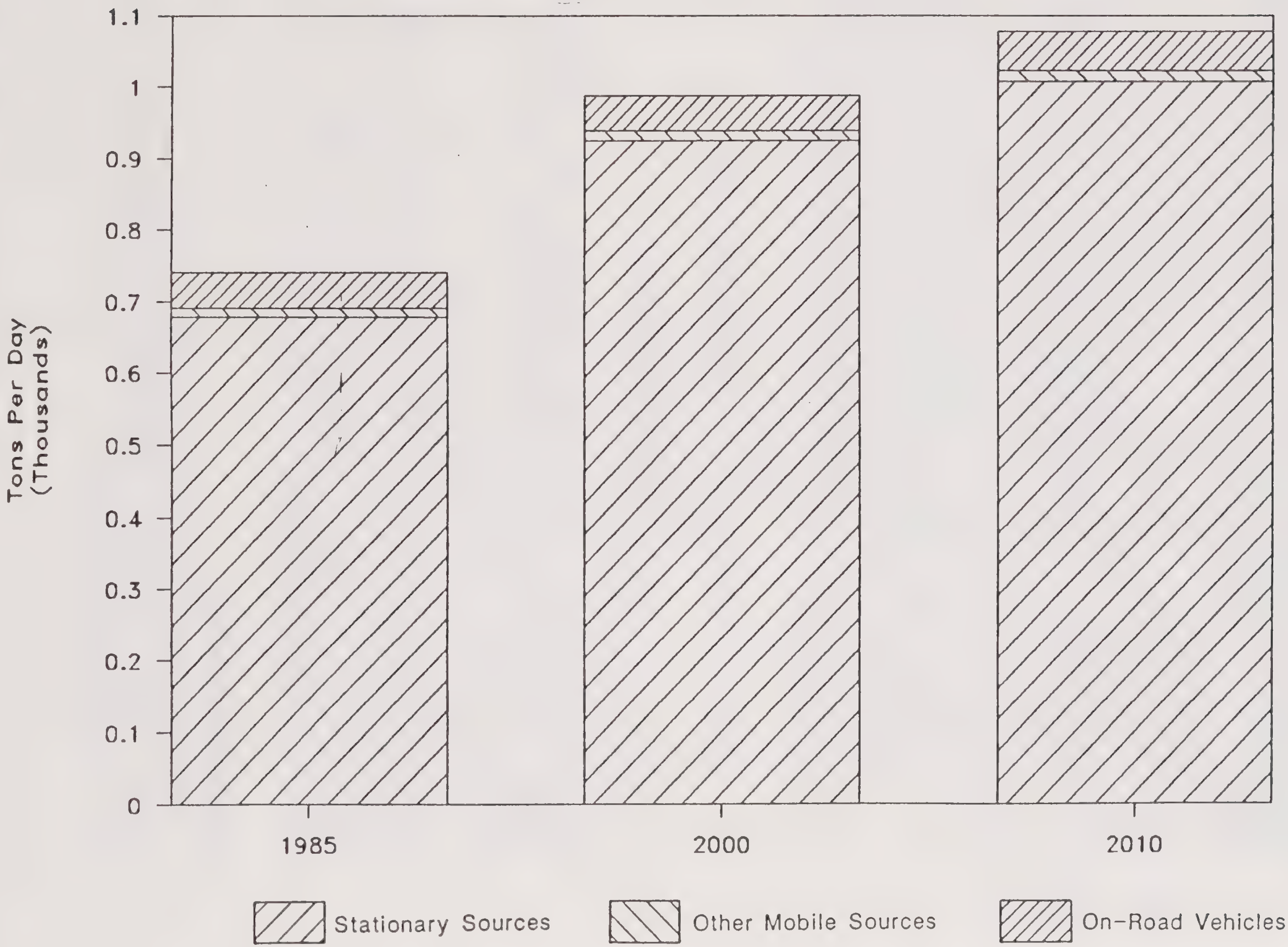
UNMITIGATED GMA-1 (NO PROJECT ALTERNATIVE)



Source: South Coast Air Quality Management District 1988a and 1988b.

Figure 8-6. Inhalable Particulates

UNMITIGATED GMA-1 (NO PROJECT ALTERNATIVE)



Source: South Coast Air Quality Management District 1988a and 1988b.

includes data on population, housing, employment, and patterns of land use within the air basin. Spatial distribution for on-road motor vehicle emissions is generated by using the Direct Travel Impact Model (DTIM) developed by Caltrans and motor vehicle emission rates from the EMFAC program developed by ARB.

Stationary sources can be broadly grouped into two categories:

- o Point sources, which have one or more pieces of equipment in a fixed location that require the issuance of a SCAQMD permit. Emissions data for point sources emitting less than 20 tons per year are maintained in SCAQMD's Automated Equipment Information System. Information on the larger point sources (more than 20 tons per year) is drawn from SCAQMD's Emissions Inventory System.

- o Area sources consist of numerous small facilities or pieces of equipment (e.g., gas stations, residential water heaters, and architectural coatings). The location of area sources is not identified specifically, but area source emissions may be calculated using socioeconomic data. For modeling purposes, area sources are spatially disaggregated to grid cells. Special studies conducted by SCAQMD, ARB, SCAG, and outside consultants are used in developing emissions data for area sources.

IMPACTS AND MITIGATION MEASURES

Definition of Significance

According to the State CEQA Guidelines (Section 15064[e] and Appendix G), a project will normally have a significant effect if it will "violate any ambient air quality standard, contribute substantially to an existing or projected air quality violation, or expose sensitive receptors to substantial pollutant concentrations."

A method for determining the significance of air quality impacts, based on the State CEQA Guidelines criteria, has been applied in this EIR. The method is described below in the "Target Emission Levels" section. In addition, consistency with the AQMP is used in this EIR as a criterion for determining the significance of impacts. The method used to make this determination is described below in the "Consistency with the Air Quality Management Plan" section.

Target Emission Levels

The 1982 AQMP contains a set of estimated allowable emission levels, the amount of emissions that could be produced in the SCAB without violating air quality standards. Table 8-12 shows the 1982 AQMP-estimated allowable emission levels for federal standards.

Table 8-12. Allowable Emissions Levels as Described in the 1982 Air Quality Management Plan

Type of Pollutant	Applicable Federal Air Quality Standard	Allowable Emissions in Tons Per Day
Reactive Organic Gas	Ozone 0.12 ppm 1-hour Average	230
Carbon Monoxide	Carbon Monoxide 9 ppm 8-hour Average	2,560
Nitrogen Oxides	Nitrogen Dioxide 0.05 ppm Annual Average	898
Sulfur Oxides	Sulfur Dioxide 0.03 ppm Annual Average	475
Particulate Matter	Particulate Matter 260 ug/m3 24-hour Average	256

Source: South Coast Air Quality Management District and Southern California Association of Governments 1982.

Note: ppm = parts per million
ug/m3 = micrograms per cubic meter

During the last 6 years, more recent estimates of allowable emission levels have been developed. The most recent estimates were prepared for the 1988 revision to the AQMP and the associated EIR (South Coast Air Quality Management District 1988d). The 1988 AQMP estimates have not directly quantified allowable emission levels. Rather, the 1988 AQMP contains estimates of whether certain packages of control measures (referred to as Tier I, Tier II, and Tier III measures) would attain air quality standards. The 1988 AQMP estimates have been used in this EIR to prepare "target emission levels," maximum emission levels that would result in attainment of air quality standards. The target emission levels are shown in Table 8-13.

The estimates shown in Table 8-13 are subject to change but are used in this EIR as criteria for determining significance since they are the most recent estimates. Conditions that result in projected SCAB emission levels that are higher than those shown in Table 8-13 are considered to have a significant impact. Conditions that result in emission levels lower than those shown in Table 8-13 are considered to have a less-than-significant impact. Table 8-14 compares allowable and estimated emission levels.

According to the criteria described above, it is possible for a future year condition to result in reduced pollutant levels, when compared to existing conditions, and still have a significant impact because projected emission levels higher than the target levels would be expected to exceed air quality standards.

The following is a description of how the values shown in Table 8-13 were developed.

Reactive Organic Gas. The 1988 AQMP Draft EIR estimates that implementation of Tier I, II, and III control measures in 2010 would result in a maximum ozone concentration of 0.126 ppm. This concentration is just above the 1-hour federal ozone standard of 0.12 ppm. The 1988 AQMP Draft EIR also estimates 2010 ROG emissions and Tier I, II, and III emission reductions. Implementation of Tier I, II, and III control measures would result in 188 tons of ROG emissions per day.

Carbon Monoxide. The 1988 AQMP Draft EIR estimates that, without implementation of 1988 AQMP control measures, 4,924 tons of CO per day would be produced in the SCAB in 2010 and that the resulting maximum CO concentration would be 13.9 ppm. The 1988 AQMP Draft EIR also estimates that, with implementation of Tier I control measures, 1,890 tons of CO per day would be produced, resulting in a maximum CO concentration of 6.8 ppm. A linear interpolation between these values is used in the GMP EIR to arrive at the estimate that 2,831 tons of CO per day would result in a maximum CO concentration of 9 ppm.

Nitrogen Oxides. The 1988 AQMP Draft EIR estimates that attainment of the federal 0.05-ppm annual average NO_2 standard could be attained with implementation of only Tier I control measures. In addition, the 1988 AQMP Draft EIR estimates that attainment of federal PM10 standards (NOx contributes to PM10 pollutants) could be attained with implementation of Tier I and II control measures. However, NOx is an ozone precursor, and the 1988 AQMP Draft EIR also estimates that implementation of Tier I, II, and III con-

Table 8-13. Target Emissions Levels Used in This EIR as Criteria for Impact Significance

Type of Pollutant	Applicable Federal Air Quality Standard	Emissions in Tons Per Day
Reactive Organic Gas	Ozone 0.12 ppm 1-hour Average	188
Carbon Monoxide	Carbon Monoxide 9 ppm 8-hour Average	2,831
Nitrogen Oxides	Ozone 0.12 ppm 1-hour Average	210
Sulfur Oxides	Inhalable Particulate 50 ug/m3 annual geometric mean or 150 ug/m3 24-hour average	47
Inhalable Particulate (PM10)	Inhalable Particulate 50 ug/m3 annual geometric mean or 150 ug/m3 24-hour average	603

Source: South Coast Air Quality Management District. 1988d.

Note: ppm = parts per million
ug/m3 = micrograms per cubic meter

trol measures would be necessary to approach the federal 1-hour ozone standard. The 1988 AQMP Draft EIR estimates 2010 NOx emissions, and Tier I, II and III emission reductions. Implementation of Tier I, II, and III control measures would result in 210 tons of NOx emissions per day.

Sulfur Oxides. The SCAB attained all federal and state SO_2 air quality standards during 1985 and 1986. However, SOx contributes to PM10 pollutants. The 1988 AQMP and Draft EIR estimate that implementation of Tier I and Tier II control measures in 2010 would result in attainment of federal PM10 standards. The 1988 AQMP also contains estimates SOx emissions and Tier I and Tier II emission reductions. Implementation of Tier I and Tier II control measures would result in 47 tons of SOx emissions per day.

Inhalable Particulates. The 1988 AQMP and Draft EIR estimate that implementation of Tier I and Tier II control measures in 2010 would result in attainment of federal PM10 standards. The 1988 AQMP also estimates 2010 PM10 emissions and Tier I and Tier II emission reductions. Implementation of Tier I and Tier II control measures would result in 603 tons of PM10 emissions per day.

Consistency with the Air Quality Management Plan

The AQMP contains estimates of emissions for 1987 and 2000 with and without implementation of recommended control measures (Table 8-15). In this EIR, consistency with these emissions projections, assuming implementation of recommended control measures, will be used as a criterion of significance. Conditions that result in projected emissions higher than those shown in Table 8-15 are considered to have a significant impact. Table 8-14 compares these emission levels with estimated emissions.

The analysis in this EIR is focused on 2010. Because 1987 and 2000 were used in projections contained in the AQMP, some judgment and reliance on available intermediate year data will be necessary.

Methodology for Emissions Projections

GMA-1 Unmitigated Conditions

2010 emissions projections for GMA-1 are presented in Tables 8-2 through 8-6 and in Figures 8-2 through 8-6 and summarized in Table 8-14. These projections are from the SCAQMD (1988b). The following summary of the emissions projections methodology is based on text from the SCAQMD document.

Baseline emissions for future years are calculated by using the following equation:

$$F.Y. = B.Y. \times C.F. \times G.F.$$

Table 8-14. Comparison of Estimated and Allowable Emissions for the South Coast Air Basin in Tons Per Day

Type of Emission	1985 Emissions	Target Emission Levels For Attainment of Standards	Year 2000 Emissions With AQMP Control Measures	2010 With Proposed Project (GMA-4 Modified)		2010 With GMA - 1 (No Project Alternative)	
				Without Mitigation	With Transportation Mitigation	Without Mitigation	With Transportation Mitigation
Reactive Organic Gas	1,246.4	188	601	1,000 - 1,100	900 - 1,000	1,153.8	900 - 1,000
Carbon Monoxide	5,430.1	2,831	1,315	3,400 - 3,500	2,500 - 2,600	4,924.3	2,650 - 2,750
Nitrogen Oxide	1,039.8	210	435	800 - 900	650 - 750	1,033.5	650 - 750
Sulfur Oxide	121.1	47	93	100 - 200	100 - 200	140.8	100 - 200
Inhalable Particulate Matter	740.7	603	639	1,000 - 1,100	1,000 - 1,100	1,077.4	1,000 - 1,100

Note: "Target Emission Levels" are from South Coast Air Quality Management District 1988d. See text for more information.

Table 8-15. Air Quality Management Plan Emissions Projections

	Emissions Without the AQMP in Tons Per Day		Emissions With the AQMP in Tons Per Day	
Pollutant	1987	2000	1987	2000
Reactive Organic Gas	1023	1087	756	601
Carbon Monoxide	5790	5730	3623	1315
Nitrogen Oxides	960	921	698	435
Sulfur Oxides	180	188	107	93
Particulate Matter	618	694	591	639

Source: South Coast Air Quality Management District and Southern California Association of Governments 1982a.

where:

F.Y. = forecasted future year emissions of an air pollutant in the SCAB,

B.Y. = base year emissions of the air pollutant (1985 is used in this report),

C.F. = control factor for a specific source category that results from existing state and local air quality regulation, and

G.F. = growth factor for a specific source category based on socioeconomic data.

Specific growth factors and control factors are described in the SCAQMD report. Projections of future year on-road vehicle emissions were prepared by using DTIM, EMFAC7D, and SCAG's socioeconomic database.

GMA-1 Mitigated, Proposed Project Unmitigated, and Proposed Project Mitigated Conditions

Table 8-14 presents ranges of projections for the mitigated GMA-1, unmitigated proposed project, and the mitigated proposed project conditions. These projections were prepared by applying factors to the unmitigated GMA-1 mobile source emissions, as described below. Ranges of projections are shown to indicate that the methods used to develop the projections involve some uncertainty.

Information presented in Chapter 7 of this EIR, "Transportation," indicates that future year travel delay and vehicle speed distribution could be substantially different from existing conditions. These changes could significantly change average emissions per trip and emissions per mile. Therefore, the number of vehicle trips and the amount of VMT were considered to be inadequate indicators of future year mobile source emissions. Instead, vehicle hours traveled (VHT) is used to calculate emissions since it is considered to be a reasonably good first-level indicator of mobile source emissions (Seitz pers. comm.). As a mobile source emissions indicator, VHT works relatively well over changing vehicle congestion conditions.

The VHT factors used to calculate the ranges of emissions are presented in Table 7-11. The VHT values were normalized to the unmitigated GMA-1 condition and applied to the mobile source portion of the baseline projections.

Since the future year regional totals for population, housing, and employment are similar under all of the alternatives, it is reasonable to assume that the regional totals for stationary and area source emissions will be the same for all of the future year conditions. However, mobile source emissions were factored.

Proposed Project

Impact: Exceedance of Target Emissions Levels

As compared to existing conditions, projected emissions would be (Table 8-14):

- o lower than 1985 emissions levels for ROG, CO, and NOx;
- o approximately the same as 1985 emission levels for SOx; and
- o higher than 1985 emission levels for inhalable particulate matter.

These projected emissions would exceed target levels for all five emission types by the following amounts (Table 8-14):

- o ROG: 400-500 percent;
- o CO: 20-25 percent;
- o NOx: 250-350 percent;
- o SOx: 100-300 percent; and
- o Inhalable particulate matter: 60-80 percent.

The exceedance of allowable emission levels is considered a significant impact. The effectiveness of two sets of mitigation measures is described below. Both sets of mitigation measures would reduce the significance of this impact, but not to a less-than-significant level. Therefore, this impact is unavoidable.

Mitigation Measures

Transportation Mitigation Measures. Chapter 7 of this EIR, "Transportation," contains a description and assessment of a set of transportation mitigation measures for the proposed project. These measures are referred to as Strategy 3 in the Draft RMP and are a subset of control measures being considered in the 1988 revision to the AQMP. The estimated effectiveness of these mitigation measures can be seen in Table 8-14 by comparing emissions for the proposed project without mitigation to emissions for the proposed project with mitigation.

The percent of emissions reduction depends on the proportion of mobile source emission contribution to each emission type. These measures would:

- o reduce ROG emissions by approximately 7 percent,
- o reduce CO emissions by approximately 26 percent,
- o reduce NOx emissions by approximately 16 percent,
- o reduce SOx emissions by approximately 67 percent, and
- o reduce inhalable particulate matter emissions by approximately 1 percent.

With this mitigation, projected emissions would:

- o exceed target emission levels for ROG, NOx, SOx, and inhalable particulate matter; and

- o be less than target levels for CO.

Additional Mitigation Measures. The primary objective of the transportation mitigation measures described above is to improve the operation of the transportation system. Additional mitigation measures are available that would not necessarily improve the operation of the transportation system, but could improve air quality.

Many of these additional measures are described in documents associated with the 1982 and 1988 revisions to the AQMP (South Coast Air Quality Management District and Southern California Association of Governments 1982a, 1982b; Southern California Association of Governments 1988c, 1988d). These measures include improved and stricter controls on stationary sources, area sources, and mobile sources. Specific sets of stationary, area, and mobile source control measures are being considered as part of the public review process for the 1988 revision to the AQMP.

No quantitative analysis of the effectiveness of these additional measures is included in this EIR. However, it is reasonable to conclude that implementing a combination of the transportation mitigation measures and these additional air quality control measures could result in CO and inhalable particulate matter emission at or below the target levels shown in Table 8-14. However, it is highly unlikely that implementing these measures could result in ROG, NOx, or SOx emissions at or below the target levels.

Impact: Inconsistency with the 1982 Air Quality Management Plan

Projected emissions under the proposed project would exceed AQMP emissions projections, assuming implementation of 1982 AQMP-recommended control measures, by the following amounts (Table 8-14):

- ROG: 75 percent;
- CO: 150-175 percent
- NOx: 75-100 percent;
- SOx: up to 100 percent; and
- Inhalable particulate matter: 50-75 percent.

This comparison of 2010 proposed project emission levels to 2000 AQMP levels may somewhat exaggerate the exceedances since it is reasonable to expect that, had the 1982 AQMP estimated 2010 emission levels, the estimates would have been higher than the estimates for 2000 shown in Table 8-14.

Despite the exaggeration, the magnitude of the exceedances leads to the conclusion that the proposed project is inconsistent with the 1982 AQMP. This inconsistency is considered a significant impact. The following mitigation measures would reduce this impact, but not to less than significant. Therefore, this impact is unavoidable.

Mitigation Measures

Transportation Mitigation Measures. Table 8-14 shows that implementation of the transportation mitigation measures would bring projected emissions closer to the 1982 AQMP emission levels. However, implementa-

tion of the transportation mitigation measures would not reduce proposed project emissions to a level at of below 1982 AQMP levels.

Additional Mitigation Measures. It is possible that implementing a combination of the transportation and additional air quality control measures could result in ROG, NOx, and SOx emissions at or below the 1982 AQMP levels shown in Table 8-14; however, it is highly unlikely that implementing these measures could result in CO or inhalable particulate matter emissions at or below the 1982 AQMP levels shown in Table 8-14.

GMA-1

Impact: Exceedance of Target Emissions Levels

As shown in Table 8-14, projected emissions for GMA-1 would be:

- o lower than 1985 emission levels for ROG and CO,
- o approximately the same as 1985 emission levels for NOx and SOx, and
- o higher than 1985 emission levels for inhalable particulate matter.

For three of the five emission types, projected emissions under this alternative would be higher than those of the proposed project. As compared to the proposed projected, projected GMA-1 emissions would be:

- o 5-15 percent higher for ROG,
- o 40-45 percent higher for CO,
- o 15-30 percent higher for NOx, and
- o approximately the same for SOx and inhalable particulate matter.

Projected emission levels for GMA-1 would exceed target levels for all five emission types by the following amounts (Table 8-14):

- o ROG: 500 percent;
- o CO: approximately 75 percent;
- o NOx: 400 percent;
- o SOx: approximately 200 percent; and
- o Inhalable particulate matter: approximately 80 percent.

The exceedances of target emission levels is considered a significant impact. Implementation of the following mitigation measures could reduce this impact, but not to less than significant. Therefore, this impact is unavoidable.

Mitigation Measures

Transportation Mitigation Measures. The set of mitigation measures applied to GMA-1 is referred to as Strategy 4 (see "Transportation" chapter). As shown in Table 8-14, implementation of these measures would:

- o exceed target emission levels for ROG, NOx, SOx, and inhalable particulate matter; and

- o be less than target levels for CO.

Additional Mitigation Measures. It is possible that implementing a combination of the transportation mitigation measures and additional air quality control measures could result in CO and inhalable particulate matter emissions at or below the target levels. However, it is highly unlikely that implementing both of these types of measures could result in ROG, NOx, or SOx emissions at or below the target levels.

Impact: Inconsistency with the Air Quality Management Plan

Projected levels of all five emission types under GMA-1 would exceed AQMP emissions projections by the following amounts (Table 8-14):

- o ROG: 90 percent;
- o CO: 250-300 percent;
- o NOx: 100-150 percent;
- o SOx: 50 percent; and
- o Inhalable particulate matter: approximately 70 percent.

As described earlier in this chapter, the comparison of 2010 GMA-1 emission levels to 2000 AQMP levels listed above may somewhat exaggerate the exceedances. However, despite the exaggeration, one can reasonably conclude that GMA-1 is inconsistent with the 1982 AQMP because of the magnitude of the exceedances. This inconsistency is considered a significant impact. The following measures would reduce this impact, but not to less than significant. Therefore, this impact is unavoidable.

Mitigation Measures

Transportation Mitigation Measures. Implementation of the transportation mitigation measures would not reduce GMA-1 emissions to a level at or below 1982 AQMP levels (Table 8-14).

Additional Mitigation Measures. It is possible that implementing a combination of the transportation mitigation measures and additional air quality control measures could result in ROG, NOx, and SOx emissions at or below the 1982 AQMP levels. However, it is highly unlikely that implementing both of these measures could result in CO or particulate matter emissions at or below the 1982 AQMP levels.

GMA-2, GMA-3, and GMA-4

Comparison to the Proposed Project

Data presented in Tables 7-1 through 7-5 and in 7-11 indicate that the transportation indicators for GMA-2, GMA-3, and GMA-4 would result in regional totals that are similar to those of the proposed project. This similarity

would extend to the regional emissions projections. The distribution of transportation indicators and, therefore, emissions projections within the region vary between the proposed project and alternatives. However, totals for the whole region vary by only a small amount.

As a result of their similarity to the proposed project, GMA-2, GMA-3, and GMA-4 are considered to have regional air quality impacts similar to those of the proposed project.

Comparison to Existing Conditions

As shown in Table 8-14, projected emissions for the unmitigated proposed project would be:

- o lower than 1985 emission levels for ROG, CO, and NOx;
- o approximately the same as 1985 emission levels for SOx, and
- o higher than 1985 emission levels for inhalable particulate matter.

Emissions projections for GMA-2, GMA-3, and GMA-4 are expected to have a relationship to existing conditions similar to that described above for the proposed project.

Comparison to GMA-1

For three of the five emission types, projected emissions under the unmitigated GMA-1 condition would be higher than those of the unmitigated proposed project as follows:

- o 5-15 percent for ROG,
- o 40-45 percent higher for CO,
- o 15-30 percent higher for NOx, and
- o approximately the same for SOx and inhalable particulate matter.

Emissions projections for GMA-2, GMA-3, and GMA-4 are expected to have a relationship to GMA-1 similar to that described above for the proposed project.

GMA-Low

Methodology

The "Methodology for Emissions Projections" section of this chapter describes the methods used to develop emissions projections for GMA-1 mitigated, proposed project unmitigated, and proposed project mitigated conditions. With one difference, the methodology described earlier in this chapter was used to develop emissions projections for GMA-Low and GMA-High.

In summary, this methodology uses projected vehicle hours traveled (VHT) as an indicator for projected mobile source emissions. The

methodology assumes that regional totals for stationary and area source emissions for all of the growth management alternatives would be the same as for GMA-1.

The assumption made for stationary and area source emissions is the one difference in methodology used for GMA-Low and GMA-High. The reason for assuming that regional totals for stationary and area source emissions for all growth management alternatives would be similar is that the future year regional totals for population, housing, and employment were identical under all of the alternatives. Since regional totals for population, housing, and employment under GMA-Low and GMA-High are different than those for the proposed project and GMA-1 through GMA-4, it cannot be assumed that stationary and area source emissions for GMA-Low and GMA-High would be similar to those for GMA-1.

Stationary and area source emissions levels are generally related to population, housing, and employment levels. Therefore, it can be reasonably assumed that regional stationary and area source emission totals under GMA-Low would be lower than emissions totals under GMA-1. Similarly, it is assumed that stationary and area source emissions under GMA-High would be higher than emissions under GMA-1. Absolute quantification of stationary and area source emissions would require detailed analysis at a fine geographic level of detail. This detailed analysis is not attempted in this regional GMP EIR.

The comparative nature of the stationary and area source emissions projections under GMA-Low and GMA-High is reflected in values shown in Table 8-16. Values for GMA-Low in Table 8-16 are shown as being less than a projected level. Values for GMA-High are shown as being greater than a projected level.

Comparison of GMA-Low to the Proposed Project

Table 8-16 presents emissions estimates under GMA-Low with and without transportation mitigation measures.

Projections under GMA-Low without transportation mitigation measures are lower than those under the proposed project without mitigation measures for the following emission types:

- o reactive organic gas,
- o carbon monoxide,
- o nitrogen oxide, and
- o inhalable particulate matter.

Sulfur oxide emissions projections under GMA-Low without transportation mitigation measures are approximately the same as those under the proposed project without mitigation measures.

Projections under GMA-Low with transportation mitigation measures are approximately the same as those under the proposed project with mitigation measures for the following emission types:

Table 8-16. Comparison of Existing and Projected Emissions for the South Coast Air Basin in Tons Per Day

		2010 With Proposed Project		2010 With GMA - Low		2010 With GMA - High	
Type of Emission	1985	Without Mitigation	With Transportation Mitigation	Without Mitigation	With Transportation Mitigation	Without Mitigation	With Transportation Mitigation
Reactive Organic Gas	1,246.4	1,000 - 1,100	900 - 1,000	< 1,050	< 950	> 1,100	> 1,000
Carbon Monoxide	5,430.1	3,400 - 3,500	2,500 - 2,600	< 3,450	< 2,550	> 4,300	> 2,800
Nitrogen Oxide	1,039.8	800 - 900	650 - 750	< 800	< 700	> 950	> 750
Sulfur Oxide	121.1	100 - 200	100 - 200	< 150	< 150	> 100	> 100
Inhalable Particulate Matter	740.7	1,000 - 1,100	1,000 - 1,100	< 1,000	< 1,000	> 1,050	> 1,050

- reactive organic gas,
- carbon monoxide,
- nitrogen oxide, and
- sulfur oxide.

Inhalable particulate matter emissions projections under GMA-Low with transportation mitigation measures are lower than those under the proposed project with mitigation measures.

GMA-High

Methodology

The methodology used to prepare emissions projections for GMA-High is described previously in this chapter in the GMA-Low "Air Quality" section.

Comparison of GMA-High to the Proposed Project

Table 8-16 presents emissions estimates under GMA-High with and without transportation mitigation measures.

Projections under GMA-High without transportation mitigation measures are higher than those under the proposed project without mitigation measures for the following emission types:

- reactive organic gas,
- carbon monoxide, and
- nitrogen oxide.

Emissions projections under GMA-High without transportation mitigation measures are approximately the same as those under the proposed project without mitigation measures for the following emission types:

- sulfur oxide, and
- inhalable particulate matter.

Projections under GMA-High with transportation mitigation measures are higher than those under the proposed project with mitigation measures for the following emission types:

- reactive organic gas,
- carbon monoxide, and
- nitrogen oxide.

Emissions projections under GMA-High with transportation mitigation measures are approximately the same as those under the proposed project with mitigation measures for the following emission types:

- sulfur oxide, and
- inhalable particulate matter.

CHAPTER 9. NOISE

SETTING

Background Information on Noise

Most sound measurements are based on sound pressure levels at various frequency ranges, with results reported using a decibel (dB) scale. Decibel scales are an index based on a ratio of the actual pressure fluctuations generated by sound waves compared to a standard reference pressure value. Figure 9-1 illustrates dB levels associated with a variety of noise sources.

Varying noise levels are often described in terms of the equivalent constant decibel level. Equivalent noise levels (Leq) are used to develop single-value descriptions of average noise exposure over various periods of time. Such average noise exposure ratings often include additional weighting factors for annoyance potential due to time of day or other considerations.

Decibel Scales Reflecting Annoyance Potential

Average noise exposure over a 24-hour period is often presented as a day-night average sound level (Ldn). Ldn values are calculated from hourly Leq values, with the Leq values for the nighttime period (10 p.m.-7 a.m.) increased by 10 dB to reflect the greater disturbance potential from nighttime noises.

Single-value average noise descriptors (such as Ldn values) are most appropriately applied to variable, but relatively continuous, sources of noise. Typical urban noise conditions, highway traffic, and major commercial airports are examples where single-value descriptors are most appropriate.

Working with Decibel Values

The nature of dB scales means that individual dB ratings for different noise sources cannot be added directly to give the dB rating of the combination of these sources. Two noise sources producing equal dB ratings at a given location will produce a composite noise level 3 dB greater than either sound alone. When two noise sources differ by 10 dB, the composite noise level will be only 0.4 dB greater than the louder source alone.

Most people have difficulty distinguishing the louder of two noise sources that differ by less than 1.5-2 dB. In general, a 10-dB increase in noise level is perceived as a doubling in loudness. A 2-dB increase represents a

FIGURE 9-1

Weighted Sound Levels and Human Response

SOUND SOURCE	dB(A)*	RESPONSE CRITERIA
	—150	
Carrier Deck Jet Operation	—140	
		Painfully Loud
	—130	Limit Amplified Speech
Jet Takeoff (200 feet)	—120	
Discotheque Auto Horn (3 feet)		Maximum Vocal Effort
Riveting Machine	—110	
Jet Takeoff (2,000 feet)		
Shout (0.5 feet)	—100	
N.Y. Subway Station		Very Annoying
Heavy Truck (50 feet)	— 90	Hearing Damage (8 hours)
Pneumatic Drill (50 feet)		
	— 80	Annoying
Freight Train (50 feet)		
Freeway Traffic (50 feet)	— 70	Telephone Use Difficult
		Intrusive
Air Conditioning Unit (20 feet)	— 60	
Light Auto Traffic (50 feet)		
	— 50	Quiet
Living room		
Bedroom	— 40	
Library		
Soft Whisper (15 feet)	— 30	Very Quiet
Broadcasting Studio	— 20	
	— 10	Just Audible
	— 0	Threshold of Hearing

*Typical A - Weighted sound levels taken with a sound-level meter and expressed as decibels on the scale. The "A" scale approximates the frequency response of the human ear.

Source: U. S. Council on Environmental Quality 1970.

15-percent increase in loudness. Figure 9-2 illustrates the relationship between decibel changes and perceived loudness.

Figure 9-2 also shows the relationship between traffic volumes, percent change in perceived loudness, and changes in decibel values. Sound levels, as measured in decibels, are relatively insensitive to changes in traffic volumes. For example, a doubling of traffic volumes (a 100-percent increase) is perceived as a 23 percent increase in noise and results in a 3-dB increase in measured noise levels.

While noise levels are insensitive to changes in traffic volumes, they are relatively sensitive to changes in traffic speeds. As the average speed of traffic drops (e.g., as a result of traffic congestion), noise levels are substantially decreased.

Noise levels are also sensitive to distance. Because the response of noise levels to distance is logarithmic, the change in noise levels can be substantial near the noise source but becomes less perceptible far away from the source.

Sound levels from an isolated noise source will typically decrease by about 6 dB for every doubling of distance away from the noise source. When the noise source is essentially on a line (i.e., vehicle traffic on a highway), noise levels decrease by about 3 dB for every doubling of distance.

Guidelines for Interpreting Noise Levels

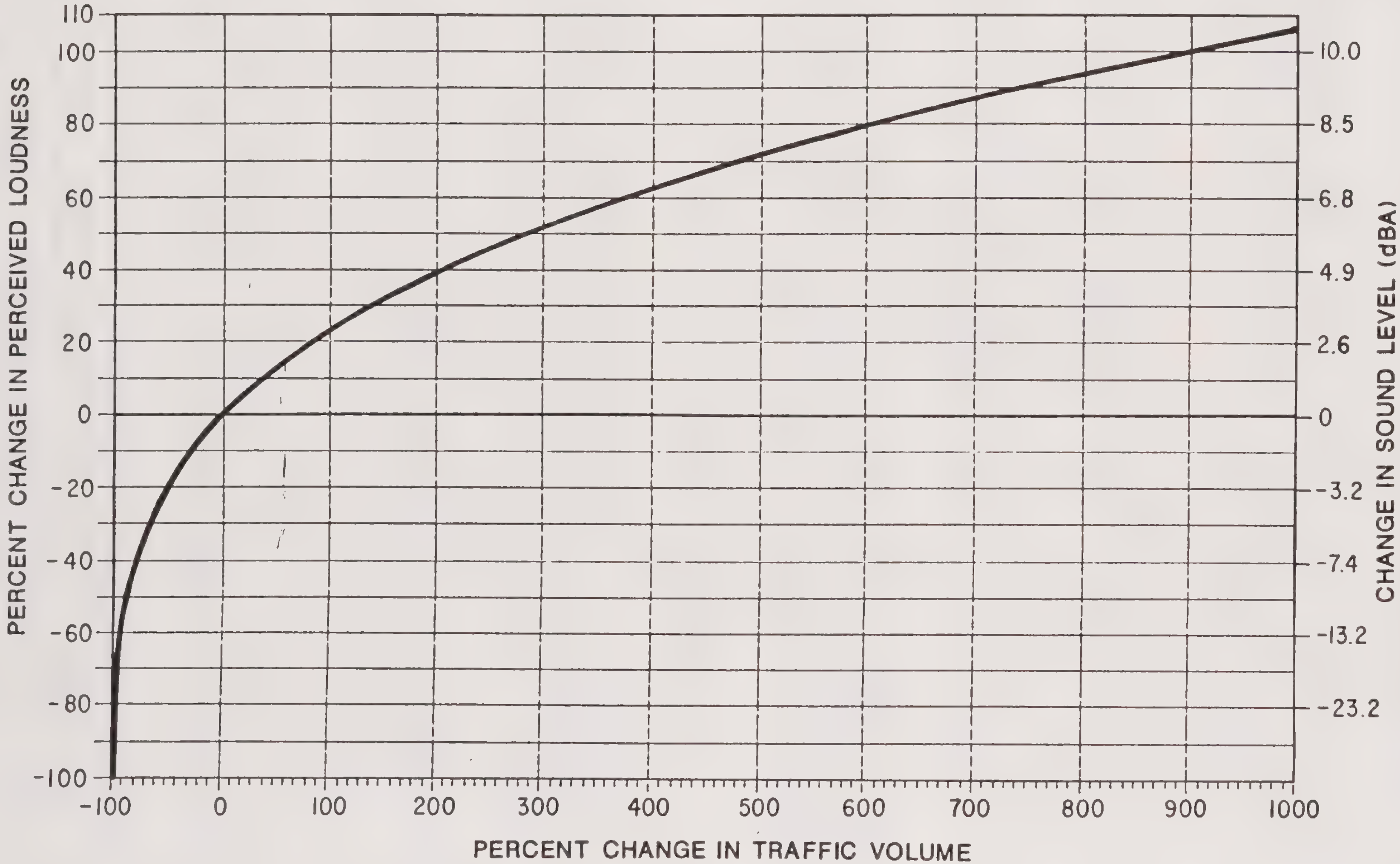
Various federal, state, and local agencies have developed guidelines for evaluating the compatibility of different land uses and various noise levels. The California Department of Health Services Office of Noise Control has published guidelines for the noise element of local general plans. These guidelines are commonly used in California to evaluate noise impacts.

The Office of Noise Control guidelines include a noise level/land use compatibility chart (Figure 9-3). This chart organizes various outdoor Ldn ranges into as many as four compatibility categories (normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable) depending on land use.

For many land uses, the chart shows overlapping Ldn ranges for two or more compatibility categories. These overlapping Ldn ranges indicate that local conditions (existing noise levels and community attitudes toward dominant noise sources) should be considered in evaluating land use compatibility at specific locations.

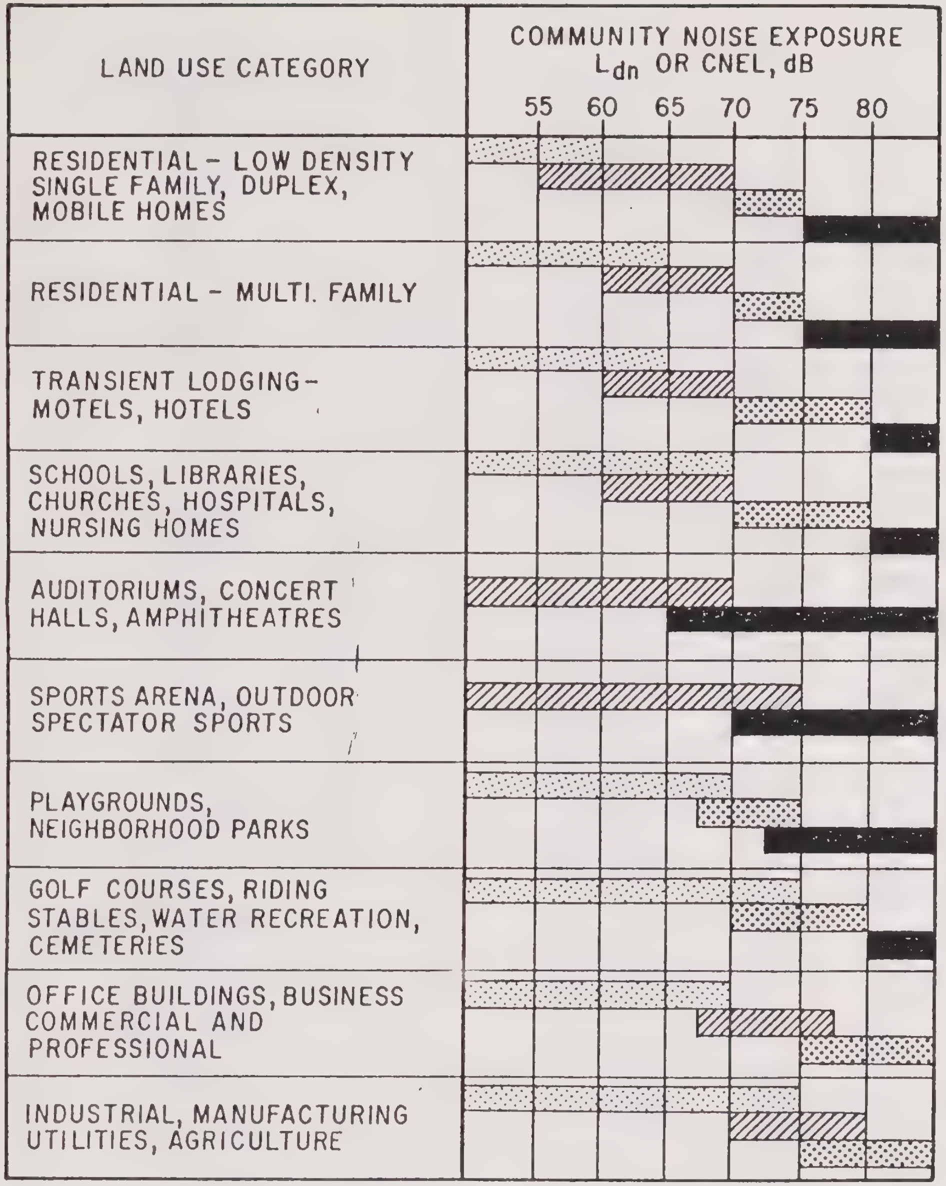
The normally acceptable range for low-density residential uses is identified as less than 60 dB, while the conditionally acceptable range is 55-70 dB. The normally acceptable range for high density residential uses is identified as Ldn values below 65 dB, while the conditionally acceptable range is identified as 60-70 dB. For educational and medical facilities, Ldn values below 70 dB are considered normally acceptable, while Ldn values of 60-70 dB are considered conditionally acceptable. For office and commercial land uses,

FIGURE 9-2



NOISE IMPACTS OF TRAFFIC VOLUME CHANGES

Jones & Stokes Associates, Inc.



INTERPRETATION

NORMALLY ACCEPTABLE

Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

CONDITIONALLY ACCEPTABLE

New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

NORMALLY UNACCEPTABLE

New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

CLEARLY UNACCEPTABLE

New construction or development should generally not be undertaken.

FIGURE 9-3. LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS

Source: California Department of Health, Office of Noise Control 1976.

Ldn values below 70 dB are considered normally acceptable, while Ldn values of 67.5-77.5 are categorized as conditionally acceptable.

Existing Noise Levels

The major noise sources in the southern California area are airports, freeways, and arterial roadways. Local collector streets are not considered to be a significant source of noise.

Noise levels in the vicinity of airports can vary substantially from airport to airport. However, Ldn values of up to 80 dB in the immediate vicinity of major airports are common.

Previous studies of noise levels in urbanized areas (Jones & Stokes Associates 1986 and 1987) indicate that the following roadway noise values are typical:

- o up to 65-70 dB along residential arterials at receptors 75 feet from the roadway centerline,
- o up to 70-75 dB along commercial and industrial arterials at receptors 75 feet from the roadway centerline, and
- o up to 75-80 dB along freeways at receptors 150 feet from the freeway centerline.

Distances of 75 feet from surface roadways and 150 feet from freeways are considered typical distances for potentially sensitive receptors in the vicinity of these facilities. The values described above do not assume the existence of sound barriers. These values indicate that sensitive receptors in the immediate vicinity of airports, freeways, and major roadways are being exposed to noise levels that exceed normally acceptable values. Receptors in the immediate vicinity of these facilities are being exposed to noise levels considered to be conditionally acceptable, normally unacceptable, and clearly unacceptable.

IMPACTS AND MITIGATION MEASURES

Definition of Significance

The Office of Noise Control guidelines (Figure 9-3) will be used in this EIR as the criteria for determining impact significance. Conditions that result in projected noise levels that exceed normally acceptable values are considered to have a significant impact.

Proposed Project

Impact: Exceedance of Normally Acceptable Noise Levels

Implementation of the proposed project would generally result in an increase in noise levels. As noted above, sensitive receptors in the immediate vicinity of airports and major roadway facilities are being exposed to noise levels that exceed normally acceptable values. Implementation of the proposed project would exacerbate noise levels in these impacted areas. Implementation of the proposed project would also expose new areas to noise levels higher than the normally acceptable levels.

Previous noise studies have been conducted that examine long-range future noise levels (Jones & Stokes Associates 1986 and 1987). These studies have assumed substantial urban development, including growth in lightly urbanized areas and growth in currently undeveloped areas. These studies indicate that:

- o Noise levels in the immediate vicinity of freeways would increase by 1-4 dB. Some infrequent increases of 5-6 dB and some infrequent decreases in noise levels can be expected.

- o Noise levels in the immediate vicinity of arterials in urbanized areas would increase by 1-3 dB. Some infrequent increases of 4-6 dB and some infrequent decreases in noise levels can be expected.

- o Noise levels in the immediate vicinity of arterials in undeveloped areas would increase by 1-6 dB if significant urbanization of areas adjacent to the roadway occurs. Some infrequent increases of more than 6 dB can be expected.

These noise levels are considered to be a significant impact. Even with aggressive implementation of the following measures, it is highly unlikely that noise levels could be mitigated to less-than-significant levels at all locations. Therefore, some locations will experience unavoidable impacts.

Mitigation Measures. In considering future land use development proposals, changes to land use regulations (e.g., general plan elements and zoning changes), improvements to existing roadways, and additions to the roadway system, local and state jurisdictions should require needed noise abatement measures to attain ~~noise levels~~ compatible with affected land uses. Acoustical analysis of specific roadways and receptors would be necessary to determine what mitigation measures would be appropriate at individual sites. Where the development of residential or other noise-sensitive land uses is proposed for a noise-impacted area, an acoustical analysis of structures should be prepared by a qualified acoustical consultant experienced in the fields of environmental noise assessment and architectural acoustics.

The acoustical analysis should include the following:

- o representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions;

- o estimated noise levels in terms of Ldn and/or other locally acceptable parameters for existing and projected future noise levels;

- o recommendations for appropriate mitigation to achieve compliance with the Office of Noise Control guidelines or local policies. Where the noise source in question consists of intermittent single events, the report should address the effects of maximum noise levels in sleeping rooms in terms of possible sleep disturbance;

- o estimates of noise exposure after the prescribed mitigation measures have been implemented; if compliance with the state or local guidelines or policies will not be achieved, a rationale for acceptance of the project should be provided;

- o recommendation of practices that ensure that maximum noise attenuation effectiveness is attained. Normal construction practices and materials for single family residences could result in interior noise levels as much as 20 dB below exterior levels (as long as windows and doors are closed). However, this reduction could be significantly degraded without proper attention to design and implementation to noise reduction features.

Many types of effective noise impact mitigation measures are available. These include the following:

<u>Noise Barriers</u>. The construction of noise barriers is a commonly effective mitigation measure. Such barriers typically take the form of earth berms, masonry walls, or a combination of walls on top of berms. The following is a discussion of some pertinent aspects of noise barriers.

- o Noise barriers can provide significant noise reductions for areas within approximately 150 feet of the barrier. Noise reductions are generally less at greater distances from the barrier.

- o Barriers must be tall enough to at least block the line of sight between the noise source and occupied levels of structures containing sensitive receptors. Minimum barrier heights of 8-12 feet are generally required to protect single-story buildings or outdoor activity areas.

- o Barriers must also be long to minimize noise transmission around their ends. Therefore, the noise barrier should extend along a significant portion of the noise source and run continuously without breaks from end to end.

- o Barrier surfaces should be of an acoustically absorbent material to significantly reduce noise reflection.

- o Noise barriers are often the only effective way to protect outdoor activity areas (yards, parks, etc.) from traffic noise. Aesthetic factors and cost are other considerations that influence the decision to use noise barriers.

Building and Site Design Features. The following are some examples of building and site design measures that could reduce interior noise levels:

- Install extra wall and ceiling insulation.

- Install double-glazed windows and sliding doors.

- Install airtight seals between window or door frames and exterior walls.

- Minimize exposure of windows and sliding doors to nearby noise sources (e.g., by shielding bedrooms and other noise-sensitive areas of dwellings from exterior noise sources with other portions of the dwelling).

- Situate nonresidential buildings to provide shielding of adjacent residential areas from traffic noise sources. Site planning for nonresidential uses in the vicinity of the project site should also give consideration to the placement and design of potential noise sources such as storage areas, loading docks, and parking lots in areas away from residential uses.

GMA-1

Impacts: Exceedance of Normally Acceptable Noise Levels

Impacts and mitigation measures for GMA-1 are not expected to be significantly different than those for the proposed project. This alternative is expected to exceed Office of Noise Control guidelines and existing noise levels. This is considered to be a significant impact. Mitigation measures would reduce the level of significance of this impact but not to a less-than-significant level.

Mitigation Measures. Mitigation measures for GMA-1 are the same as those described for the proposed project.

GMA-2, GMA-3, and GMA-4

Impacts: Exceedance of Normally Acceptable Noise Levels

Impacts and mitigation measures for GMA-2, GMA-3, and GMA-4 are the same as those described for the proposed project

GMA-Low

Noise levels under GMA-Low would be generally similar to expected noise levels under the proposed project.

GMA-High

Noise levels under GMA-High would generally be similar to noise levels expected under the proposed project.

CHAPTER 10. ECOLOGICAL RESOURCES

SETTING

The six-county SCAG region contains an extensive array of biological resources that have developed in response to the wide range in topography and climate. Marked differences in temperature and rainfall occur within short distances. Tall, sometimes snow-capped mountains rise adjacent to deserts. The ocean moderates coastal temperatures, while temperatures are often extreme in adjacent deserts and mountains.

The native and naturalized vegetation of the region can be grouped into recognizable plant communities. Coastal strand plants once grew on most sandy beaches and dunes. These plants have almost disappeared as a result of heavy development on the coastline. Likewise, coastal saltmarsh and freshwater marshes have been filled or dredged to create upland developments, marinas, and ports. Much of the development in these habitats took place before the widespread recognition of their wildlife and aquatic habitat values. The few remaining native coastal habitats have been set aside in public and private reserves.

The coastal and inland mountains support coastal sage scrub and chaparral. Coastal sage scrub, once an abundant habitat, is now disappearing because of residential and other development in urbanizing areas. Chaparral habitats are large, brush-covered slopes that fuel extensive wildfires and imperil property. Fire suppression activities reduces the frequency of chaparral fires but also makes fires more intense and destructive when they occur.

The hot, dry inland valleys formerly supported valley grasslands. Urbanizing areas in western San Bernardino and Riverside Counties supported extensive grasslands. Grassland habitats were first displaced by farming and recently by development. Higher elevation areas support southern oak woodlands and, above 5,000 feet, support montane coniferous forests. Most of the forests occur on U. S. Forest Service lands. The oaks are impacted by continued urbanization and, in more remote areas, by harvesting for firewood. The coniferous forests in the mountains north and east of the Los Angeles basin are affected by air pollution and heavy recreation use.

Desert lands in San Bernardino, Riverside, and Imperial Counties support the abundant creosote brush scrub on the floor of the valleys, Joshua tree woodlands at selected rainfall and middle elevations, and pinyon-juniper woodlands on the higher mountains. Alkali sinks occur where drainage is poor. Although much of the desert is open, some residential and extensive recreation use has affected large areas of the lower elevation and flatter terrain.

Stream channels pass through all of these habitats, but most channels carry only water during rainfall events or during spring. The riparian areas usually support lush vegetation and are the primary wildlife breeding, feeding, nesting locations or travel corridors for surrounding habitats. In many areas, large trees and shrubs are found only in and along stream courses and dry washes.

All of these plant communities support assemblages of wildlife species from insects and other invertebrates to medium- and large-size mammals. The large human population of the SCAG region has greatly reduced wildlife populations and changed species composition over the last century. Plant and animal species in some areas have been reduced to just a few individuals. The most impacted species (Table 10-1), have been afforded special protection under federal and state laws, including the Endangered Species Act. Lists of species being considered for designation contain several times as many species as are already on the state and federal lists. Some of the species being considered include insects of very limited distribution: the Stephen's kangaroo rat, which is being considered for federal listing; and the desert tortoise, which is being considered for state listing.

IMPACTS AND MITIGATION MEASURES

Proposed Project

The following discussion of impacts and mitigation is offered in a regional context and, except for a few examples, is not site specific. From a regional perspective, no significant differences exist among the proposed project and the four alternatives. At the site-specific level (e.g., comparing various locations for a planned unit development), there could be important differences to specific habitat types or endangered species.

Impact: Habitat Loss from Encroaching Development

Human population growth would result in the loss of substantial acreages of native habitats in the SCAG region. Losses would result from construction of residential, business, and industrial developments; roads; and other infrastructure. Urban growth would prompt development of other lands for landfills, flood control, sludge composting, water storage, energy production, materials extraction, and recreation areas. New habitat losses would be concentrated at the fringes of existing development areas, in the urbanizing subregion. Development in the mountain/desert subregions would heavily impact fragile habitats, particularly where deserts meet mountains.

The pattern of expected growth would result in losses of habitats in areas where previous losses have already been great. Habitats such as coastal sage scrub, southern oak woodland, and valley grasslands would be subjected to substantial additional habitat loss. Increased intensity of development in the urban subregions will, however, make it increasingly difficult to protect these small habitat fragments. Remnant coastal habitats, such as coastal wetlands (saltwater and freshwater marshes) and coastal

Table 10-1. Federal- and State-Designated Endangered, Threatened, and Rare Plant and Animal Species of the SCAG Region, by County (Excluding Offshore Island Species)

Species		Status[a]
Imperial County		
Peirson's milk-vetch	*Astragalus magdalenae* var. *peirsonii*	SE
Weggins' croton	*Croton wigginsii*	SR
Mexican flannelbush	*Fremontodendron mexicanum*	SR
Algodones dunes sunflower	*Helianthus nieveus* ssp. *tephrodes*	SE
Bald eagle	*Haliaeetus leucocephalus*	FE, SE
Yuma clapper rail	*Rallus longirostris yumanensis*	FE, ST
California brown pelican	*Pelecanus occidentalis californicus*	FE, SE
Aleutian Canada goose	*Branta canadensis leucopareia*	FE, SE
Desert pupfish	*Cyprinodon macularis*	FE, SE
California black rail	*Laterallus jamaicensis coturniculus*	ST
Western yellow-billed cuckoo	*Coccyzus americus occidentalis*	ST
Los Angeles County		
Coastal dunes milk-vetch	*Astragalus tener* var. *titi*	SE
Thread-leaved brodiaea	*Brodiaea filifolia*	SE
Slender-horned spineflower	*Centrostegia leptoceras*	FE, SE
Saltmarsh bird's-beak	*Cordylanthus maritimus* ssp. *maritimus*	FE, SE
Santa Monica Mountains dudleya	*Dudleya cymosa* ssp. *marcescens*	SR
Santa Susana tarplant	*Hemizonia minthornii*	SR
Nevin's barberry	*Mahonia nevinii*	SE
Unarmored three-spine stickleback	*Gasterosteus aculeatus williamsoni*	FE, SE
El Segundo blue butterfly	*Euphilotes battoides allyni*	FE
Palos Verdes blue butterfly	*Glaucopsyche lygdamus palosverdesensis*	FE
American peregrine falcon	*Falco peregrinus anatun*	FE, SE
California condor	*Gymnogyps californianus*	FE, SE
Light-footed clapper rail	*Rallus longirostris levipes*	FE, SE
California least tern	*Sterna antillarum browni*	FE, SE
Least Bell's vireo	*Vireo bellii pusillus*	FE, SE
Belding's savannah sparrow	*Passerculus sandwichensis beldingi*	SE
Orange County		
Salt marsh bird's-beak	*Cordylanthus maritimus* ssp. *maritimus*	FE, SE
Santa Monica Mountains dudleya	*Dudleya cymosa* ssp. *marcescens*	SR
Laguna Beach dudleya	*Dudleya stolonifera*	ST
Santa Ana River woolly-star	*Eriastrum densifolium* ssp. *sanctorum*	FE, SE
California brown pelican	*Pelecanus occidentalis californicus*	FE, SE
California least tern	*Sterna antillarum browni*	FE, SE
Light-footed clapper rail	*Rallus longirostris levipes*	FE, SE
Belding's savannah sparrow	*Passerculus sandwichensis beldingi*	SE
Western yellow-billed cuckoo	*Coccyzus americus occidentalis*	ST
California black rail	*Laterallus jamaicensis coturniculus*	ST
Riverside County		
Thread-leaved brodiaea	*Brodiaea filifolia*	SE
Slender-horned spineflower	*Centrostegia leptoceras*	FE, SE
Cuyamaca larkspur	*Delphinium hesperium* spp. *cuyamacae*	SR
Santa Ana River woolly-star	*Eriastrum densifolium* ssp. *sanctorum*	FE, SE
San Diego button-celery	*Eryngium aristulatum* var. *parishii*	SE
Mohave tarplant	*Hemizonia mohavensis*	SE
Tahquitz ivesia	*Ivesia callida*	SR
Nevin's barberry	*Mahonia nevinii*	SE
California orcutt grass	*Orcuttia californica*	SE
Southern rubber boa	*Charina bottae umbratica*	ST
Desert slender salamander	*Batrachoseps aridus*	FE, SE
Bald eagle	*Haliaeetus leucocephalus*	FE, SE
Coachella Valley fringe-toed lizard	*Uma inornata*	FT, SE
Yuma clapper rail	*Rallus longirostris yumanensis*	FE, SE
Desert pupfish	*Cyprinodon macularius*	FE, SE
Least Bell's vireo	*Vireo bellii pusillus*	FE, SE
Stephens' kangaroo rat	*Dipodomys stephensi*	proposed FE, ST
Peninsular bighorn sheep	*Ovis canadensis cremnobates*	ST
Elf owl	*Micrathene whitneyi*	SE

Table 10-1. Continued

Species		Status
San Bernardino County		
Thread-leaved brodiaea	Brodiaea filifolia	SE
Slender-horned spineflower	Centrostegia leptoceras	FE, SE
Saltmarsh bird's-beak	Cordylanthus maritimus ssp. maritimus	FE, SE
Santa Ana River woolly-star	Eriastrum densifolium ssp. sanctorum	FE, SE
Thorne's buckwheat	Eriogonum ericifolium var. thornei	SE
Mohave tarplant	Hemizonia mohavensis	SE
Parish's checkerbloom	Sidalcea hickmanii ssp. parishii	SR
Bird-footed checkerbloom	Sidalcea pedata	FE, SE
Slender-petaled thelypodium	Thelypodium stenopetalum	FE, SE
Southern rubber boa	Charina bottae umbratica	ST
Mohave tui chub	Gila bicolor mohavensis	FE, SE
Bald eagle	Haliaeetus leucocephalus	FE, SE
Yuma clapper rail	Rallus longirostris yumanensis	FE, SE
Least Bell's vereo	Vireo bellii pusillus	FE, SE
Elf owl	Micrathene whitneyi	SE
Mohave ground squirrel	Spermophilus mohavensis	ST
Western yellow-billed cuckoo	Coccyzus americanus occidentalis	ST
Ventura County		
Saltmarsh bird's beak	Cordylanthus maritimus ssp. maritimus	FE, SE
Santa Monica Mountains dudleya	Dudleya cymosa ssp. marcescens	SR
Conejo buckwheat	Eriogonum crocatum	SR
Santa Susana tarplant	Hemizonia minthornii	SR
Island night lizard	Kaluberina riversiana	FT
American peregrine falcon	Falco peregrinus anatum	FE, SE
California condor	Gymnogyps californianus	FE, SE
California brown pelican	Pelecanus occidentalis californicus	FE, SE
California least tern	Sterna antillarum browni	FE, SE
Light-footed clapper rail	Rallus longirostris levipes	FE, SE
Least Bell's vireo	Vireo bellii pusillus	FE, SE
Belding's savannah sparrow	Passerculus sandwichensis beldingi	SE

[a] Status definitions:

SR = state rare
ST = state threatened
SE = state endangered
FT = federally threatened
FE = federally endangered

Source: U. S. Fish and Wildlife Service 1984; York 1985; and California Department of Fish and Game 1987 a, b.

strand (dunes and beaches) have been nearly eliminated or highly modified, but now are largely protected by regulation of private uses.

The loss of extensive acreage of habitats would cause substantial declines in plant and animal populations. These declines may result in local or complete extinction of species and subspecies. Many more species may be listed as threatened or endangered. Listing may assist in protecting some species, but it would not guarantee that they would be protected from private actions on private lands. Habitat losses and consequent threats to many plant and animal species are a significant impact. To mitigate this impact to a less-than-significant level, development of a comprehensive, coordinated biological resources identification and protection plan would be required, and all of the measures identified below would have to be implemented successfully.

Mitigation Measures

- o Local jurisdictions in the SCAG region, in their respective general plans, should adopt policies with the following objectives:

  - conduct detailed inventories of biological resources that need protection to preserve natural diversity at the local and regional level;

  - preserve unique natural areas;

  - preserve prime agricultural lands, especially where such lands are connected to lands permanently set aside as conservation or open space lands;

  - avoid significant habitats as a prerequisite for future development plans;

  - improve the identification and implementation of mitigation measures for potentially impacted biological resources at the local level; and

  - develop mitigation funding mechanisms and other funding sources to purchase and dedicate important biological resource lands as reserves and preserves.

- o SCAG should develop a comprehensive regional plan to protect biological resources.

Impact: Fragmentation of Remaining Habitats

Continued development would fragment remaining wildlands and thereby reduce their value to wildlife and plant species. Habitat fragmentation may reduce the size of remaining habitat areas and the populations they support, by reducing gene flow of individual species between isolated remnant areas, and by making lands more susceptible to disturbance from surrounding areas.

Fragmentation can be caused by development of infrastructure such as highways. Major arterials and freeways, fenced or unfenced, provide barriers to movement for terrestrial wildlife species that do not fly. Individuals that attempt to cross such barriers may be killed.

Reduction in the size of remaining wildland areas may eliminate wildlife species that have large home ranges and low population densities. Small remnant areas may be too small to support genetically viable populations of large mammalian species such as the mountain lion. The continued decline of the California condor despite substantial recent management effort, for example, is partly attributable to the effects of small population size resulting from early inattention to the species' precarious status.

Isolation of remnant areas by intervening development prevents movements of animals between occupied areas. Certain genes may be lost from smaller, isolated populations. Isolation can also increase inbreeding and thereby reduce genetic diversity. Loss of genetic diversity may lead to retention and magnification of detrimental genes that reduce reproductive success and survival. In the long term, genetic losses may cause populations to become less adaptable to changes in environmental conditions and can lead to population extinction. Isolation of areas also inhibits movements of animals to repopulate areas where local populations have become extinct.

Remnant areas surrounded by development may also lose habitat value because of intrusions from adjacent areas. Disturbances from adjacent areas that significantly reduce habitat values include unintentional disturbance by recreation users, vandalism, introduction of exotic plants and animals, and predation by domestic pets. These effects may reduce or eliminate populations of sensitive species, particularly at the margins of the remnant lands. Remnant patches of habitat can become increasingly smaller areas of useful habitat, leading ultimately to loss of all wildland species. Wildland species are often easily displaced in such areas by human-associated species (e.g., starling and brown-headed cowbird).

Areas that are left as remnants are often not the best quality habitat for species before development. Isolation of species in low-quality habitats can further hasten loss of genetic fitness. Remnant areas may also be too small to support the full species complement of a particular community.

This impact is significant but could be reduced to less than significant through implementation of the following measures:

Mitigation Measures

o Local jurisdictions in the SCAG region, in their respective general plans, should adopt policies with the following objectives:

  - establish buffers where wildlands meet new development to form a transition area and provide some space between development and wildlands that need protection;

  - establish corridors between remnant habitat areas or between remnants and large wildland parcels in general and specific plans and in local, subregional, and regional conservation and open space

planning. Corridors can be used for nonintensive development. Large transmission lines or pipelines rights-of-way can serve the multiple functions of both infrastructure and wildlife habitat if such uses are included in the planning and design; and

- identify areas where fragmentation may be a problem, and develop measures to reduce isolation by providing or maintaining corridors between areas, translocating individual animals if numbers become too low, and providing buffers.

Impact: Loss of Riverine, Riparian, and Wetland Habitats

Proposed water development and flood control projects could substantially reduce riparian wildlife, plant, and fish habitat values. Riverine and aquatic habitats in southern California are particularly important to plant and animal populations and are highly sensitive to disturbance. Several species, including the endangered least Bell's vireo, depend on riparian (streamside) woodlands and shrublands and have declined substantially in southern California.

The construction of residential and other kinds of development adjacent to riparian areas reduce the use of the riparian zone by wildlife. Riparian zones provide travel corridors for wildlife moving from one area to another.

Flood control projects can indirectly result in habitat loss by providing flood protection for lands earlier considered undevelopable. Once released from their flood hazard status, former flood-prone areas can be ideal for development. Riparian habitat sometimes develops on sediment deposits at the upper ends of reservoirs; these areas may have substantial habitat value.

Resource extraction in the form of sand and gravel (aggregate) mining can heavily impact existing and former stream channels. Aggregate mining removes substrates used by fish in the stream channel and by riparian plant species in stream-side and floodplain riparian sites.

This impact is significant but could be reduced to less than significant through implementation of the following measures:

Mitigation Measures

o Local jurisdictions in the SCAG region, in their respective general plans, should adopt policies with the following objectives:

  - use open space and conservation designations to protect riverine, riparian, and freshwater wetlands from development;

  - promote protection of natural flood control channels and recreation of naturalized channels such as those promoted under the California Department of Water Resources Urban Creeks Program;

  - support the design of flood control channels to accommodate flood flows in vegetated channels;

- require all projects that impact riverine, riparian, and wetlands resources to mitigate any habitat impacts by recreating the habitats that are lost;

- support local, subregional, and regional mitigation banks that create or restore degraded riparian or wetland habitats, especially in large blocks; and

- facilitate coordination with U. S. Army Corps of Engineers on Section 10/404 permits (dredged/discharge fill material) and with the California Department of Fish and Game on Fish and Game Code Section 1601-3 agreements (streambed alterations) for maximum habitat creation protection and restoration.

Impact: Loss of Individuals and Habitat for Rare, Threatened, and Endangered Species

An increasing number of plant and animal species in southern California have been so impacted by development that their existence is threatened. Especially impacted are coastal strand, wetland, and riparian species such as the California least tern, the light-footed clapper rail, and the least Bell's vireo. All of the species listed by the federal government or the State of California in southern California as rare, threatened, or endangered have lost most of their prime habitat. Continued development would further reduce listed species habitats. Even though some reserves have been established, listed species usually do not have sufficient populations to withstand any additional habitat encroachment. The urbanizing subregions are losing listed and other declining plant species through development on alluvial fans now protected from flood hazard. In the mountain subregions, mining and limestone quarrying are removing plant habitats. Plants, even more than animals, may be tied through genetic makeup to very small areas where conditions are conducive to their growth.

This impact is significant but could be reduced to less than significant through implementation of the following measures:

Mitigation Measures

o Local jurisdictions in the SCAG region, in their respective general plans, should adopt policies with the following objectives:

  - require surveys as part of the planning process for all species that are candidate, proposed, or listed under the federal and state Endangered Species Acts. Conducting surveys early in the planning process on large (multiproject) areas will help to build protection into plans. All general plans and amendments should include thorough surveys of all listed species habitats;

  - require adequate mitigation for any development that would have an impact on listed species;

  - encourage monitoring of mitigation activities, and ensure that provisions be made in entitlements for successful implementation;

- encourage enhancement of habitats for listed species and protection of species whose numbers are approaching levels whereby they soon will be listed;

- recognize the development of Habitat Conservation Plans (HCP) (Section 10 of the federal Endangered Species Act) or their equivalents. These special land use plans incorporate large areas and many ownerships to cooperatively support a listed species. HCPs are now being prepared under the guidance of the San Diego Association of Governments for the least Bell's vireo; and

- encourage the development of public and private mitigation banks that incorporate large areas where habitats can be acquired, created, or enhanced to compensate for habitat lost to development.

Impact: Loss of Habitats from Wildland Fires and Fire Suppression

Development in chaparral creates a paradox. Fires are suppressed to protect development, but fire suppression methods result in the buildup of fuel loads. Thus, when infrequent fires occur, they burn hotter and are much more destructive. These fires consume chaparral and tree species, leaving the hillsides exposed to erosion and subsequent flooding hazards.

As development moves increasingly into brush-covered areas, public pressure would increase to protect such development. Often the response is to remove brush, replace it with other vegetation, or irrigate it. Thus, wildlife supported in chaparral areas would be displaced by development and then further impacted in adjacent areas by fire suppression and management techniques.

This impact is significant but could be reduced to less than significant through implementation of the following measures.

Mitigation Measures

o Local jurisdictions in the SCAG region should support fire hazard mitigation planning that seeks to suppress fuel loads without removing all the vegetation. Such mitigation planning should recognize that young brush in unmanaged small stands is preferable for wildlife habitat and poses a smaller fire hazard than large old stands, and that mosaics of grassland and brush patches can support high wildlife habitat values.

Impact: Recreational Impacts in Desert, Mountain, and Coastal Areas

The California desert provides important recreational opportunities for millions of southern Californians. Widespread use of desert lands has raised concerns over impacts to plant and animal populations. Human population growth would increase impacts by increasing the number of participants in recreational activities, by locating new populations closer to desert areas, and by increasing development within the desert itself. Major desert impacts

caused by recreational use include habitat destruction and intentional and unintentional wildlife disturbance.

Increased use of off-highway vehicles (OHVs) would intensify major impacts to desert species and habitats. OHV use may result in direct mortality to plants and animals and ultimately may destroy habitat areas and their constituent species. Direct mortality attributable to OHVs, for example, has been implicated in the decline of the desert tortoise, a species proposed for listing under the state Endangered Species Act. Noise and other human disturbance has led nesting raptors and other species to abandon certain areas. Habitat losses have been significant in many parts of the desert.

Management of OHV use on public lands is the responsibility of the U. S. Bureau of Land Management (BLM). Restrictions on OHV use have been imposed by BLM, but enforcement is uneven because of budget and staff limitations. The U. S. Senate is considering legislation to designate additional portions of the desert as national parks and wilderness areas to protect biological and other resources. Without some increase in protection by BLM or designation as parks or wilderness areas and increased funding for management, habitat impacts are expected to accelerate in the future.

Other recreation-associated impacts to desert plants and wildlife include harassment or illegal harvest of wildlife and illegal removal of cacti and other desert plants. Development in land adjacent to natural habitats may encourage introductions of destructive nonnative plant and animal populations.

Mountain areas are also impacted by recreationists because they occupy a small acreage and are used by large numbers of recreationists. National forest lands include virtually all the coniferous forests in the region. Human population increases would further impact the forest and mountain areas, because more recreationists will be using less open land.

Coastal resources also would be further impacted by recreationists. While much of the few remaining habitat area is protected in public ownership, increased activities adjacent to the habitats would reduce wildlife values. Intertidal and nearshore marine resources would also be impacted by additional recreationists. While marine reserves and preserves protect some intertidal areas, the sheer volume of users would further degrade the areas.

This impact is significant but could be reduced to less than significant through implementation of the following measures:

<u>Mitigation Measures</u>

- o Local jurisdictions in the SCAG region should adopt policies with the following objectives:
  - coordinate local park planning with the appropriate state departments and federal agencies;
  - support adequate funding for law enforcement personnel to protect reserve, preserves, parks, and other public lands;

- support a wide range of facilities from intensive activity park sites to wilderness areas; and

- use results of habitat and species surveys previously discussed to identify areas to be avoided for incompatible recreational activities and facilities.

Impact: Reduced Tree Vigor and Increased Tree Mortality from Air Pollution

Increased human populations would increase pollutant emissions and concentrations. Widespread air pollution impacts documented in midelevation conifer forests in southern California include reduced tree vigor and tree mortality. Over the long term, such effects could eliminate more sensitive species or at least reduce species densities in these habitats. As the density of tree species declines, other habitat responses may occur. These changes would alter wildlife populations and may cause local extinctions. Recreational activities in pollution-affected forests could compound impacts on tree vigor. This impact is significant but could be mitigated to less than significant through implementation of the following measures:

Mitigation Measures

o Local jurisdictions in the SCAG region should adopt policies with the following objectives:

  - support continued research to find strains of coniferous species that are more tolerant of pollutants; and

  - implement the air pollution mitigation measures identified by the 1988 AQMP.

Impact: Pollution of Nearshore Ocean Waters

Continued population growth in the SCAG region would increase the discharge of pollutants to ocean waters. (See the "Water Quality" section of Chapter 6.) Pollutants entering nearshore waters can be absorbed and accumulated by invertebrates, fishes, and marine mammals. Some pollutants cause abnormalities in reproduction and growth of ocean species. Substances can be transferred to humans through the food chain when fish or shellfish are consumed.

This impact is significant but could be reduced to less than significant through implementation of the following measures:

Mitigation Measures. Refer to the water quality measures for coastal areas identified in Chapter 6.

GMA-1

Impact. This alternative would have similar significant impacts to those described above for the proposed project. These impacts could be reduced to less than significant through implementation of the following measures.

Mitigation Measures

- Same as those identified for the proposed project.

GMA-2, GMA-3, and GMA-4

These alternatives would have effects similar to those described for the proposed project.

GMA-Low

Impacts under GMA-Low would be similar in nature to those under the proposed project. The magnitude of the impacts are likely to be lessened under GMA-Low with less habitat loss from construction and population growth.

GMA-High

Impacts under GMA-High would be similar in nature to those under the proposed project. The magnitude of the impacts is likely to increase under GMA-High with greater habitat loss from construction and population growth.

CHAPTER 11. GEOLOGY AND HYDROLOGY

SEISMICITY

Setting

Historical Seismicity

Earthquakes are a relatively common occurrence in the SCAG region. The most damaging quakes of recent history occurred in 1933 (Long Beach) and 1971 (San Fernando). Many earthquakes of magnitudes greater than these two quakes have affected the SCAG region. It is the location of the quakes' epicenter within the heavily populated Los Angeles region that is principally responsible for the extensive damage created by the Long Beach and San Fernando earthquakes.

Numerous faults underlie the SCAG region, subjecting its entire area to at least one of several seismic hazards (Figure 11-1). Most major faults in the area are a part of the San Andreas fault system including the Sand Hills, Pinto Mountain, San Jacinto, and Garlock branches. The Malibu-Santa Monica-Raymond Hill, Whittier-Elsinore, and Newport-Inglewood faults are major ones of the region that are not associated with the San Andreas fault system. These faults are generally associated with lower magnitude maximum credible earthquakes than those in the San Andreas system but are potentially more damaging because they underly the most densely populated areas of the SCAG region.

Losses for the 1971 San Fernando quake are estimated to have reached $504,950,000 and to have taken 65 lives (U. S. Geological Survey 1985). While many preventative measures have been taken to reduce casualties and damages stemming from future earthquake activity in the SCAG region, earthquake exposure and damage resulting from seismic activity is an unavoidable consequence of living in the region.

Scenarios of Future Earthquake Damage

Scenarios involving several postulated earthquake magnitudes, faults, and epicenter locations have been developed by governmental agencies. An extensive scenario of damages resulting from a maximum credible earthquake of magnitude 8.3 along the San Andreas fault has recently been completed by the California Department of Mines and Geology (CDMG). The scenario estimates the extent of damage to transportation facilities, water supplies, sewer lines, communication systems, and other facilities deemed essential to recovery from a large earthquake.

Scenarios for movement along the Newport-Inglewood fault zone predict greater damages and casualties for quakes of less than the 8.3 magnitude recorded along the San Andreas fault, because it lies directly under Los Angeles, the most extensively populated area of the SCAG region (U. S. Geological Survey 1985). A magnitude 7.5 quake along the Newport-Inglewood fault zone probably would cause 4,400 to 21,000 deaths, result in hospitalization of 17,600-84,000 quake victims, and cause losses of more than 62 billion dollars in direct damages to structures and property. The imminence of a catastrophic seismic event in the SCAG region is illustrated in a statement by CDMG: "A catastrophic earthquake having a magnitude (M) of 8.3 on the south-central San Andreas fault is likely before the end of the twentieth century and is estimated to have a current annual probability of occurrence between two and five percent" (California Department of Mines and Geology 1982).

Types of Earthquake Damage

Several different phenomena generated by seismic activity are potentially capable of damaging structures and property or endangering lives: surface rupture, ground shaking, soil liquefaction, land subsidence, and tsunamis. Ground surface rupture is perhaps the most grievous of seismic activity because of its tremendously disruptive effect and capacity for displacing foundations and ground surfaces. A rupture is defined as an opening or tear in the earth that occurs along a fault. Faults and contiguous areas that are considered susceptible to ground rupture are delineated as Alquist-Priolo Special Studies Zones. Generally, these zones within the SCAG region lie along the major faults found in the study area, but also occur along some of the smaller faults. Fortunately, surface rupture is generally confined to areas overlying or immediately adjacent to a fault.

Ground shaking affects all portions of the SCAG region, however less densely populated areas are generally less susceptible to damage because they lack the extensive utilities, roadways, tall buildings, elevated freeways, and other earthquake damage-prone facilities found in urban areas. The intensity of ground shaking generally decreases with distance from the epicenter of a quake, but soil and bedrock conditions under a particular location also affect the intensity of ground shaking. Figure 11-1 shows the contour intervals that delineate maximum credible rock accelerations during ground shaking for the SCAG region. For purposes of this study, areas credited with a maximum credible rock acceleration of less than 0.2g (two tenths the acceleration of gravity) are considered to have a negligible hazard rating, areas with an acceleration of 0.2-0.5g are considered a moderate hazard, and areas greater than 0.5g are considered to be in a severe hazard area.

Subgrade material type in an area also affects the intensity of ground shaking. The presence and depth of alluvium and groundwater can substantially intensify ground shaking in an area over that which occurs in areas underlain by bedrock. Landslides, soil liquefaction, and land subsidence are potential hazards that also may occur when triggered by ground shaking. Soil conditions characterized by saturated soil on slopes or unconsolidated saturated sand deposits underlying any terrain are susceptable to landslide, soil liquefaction, or land subsidence hazards during an earthquake.

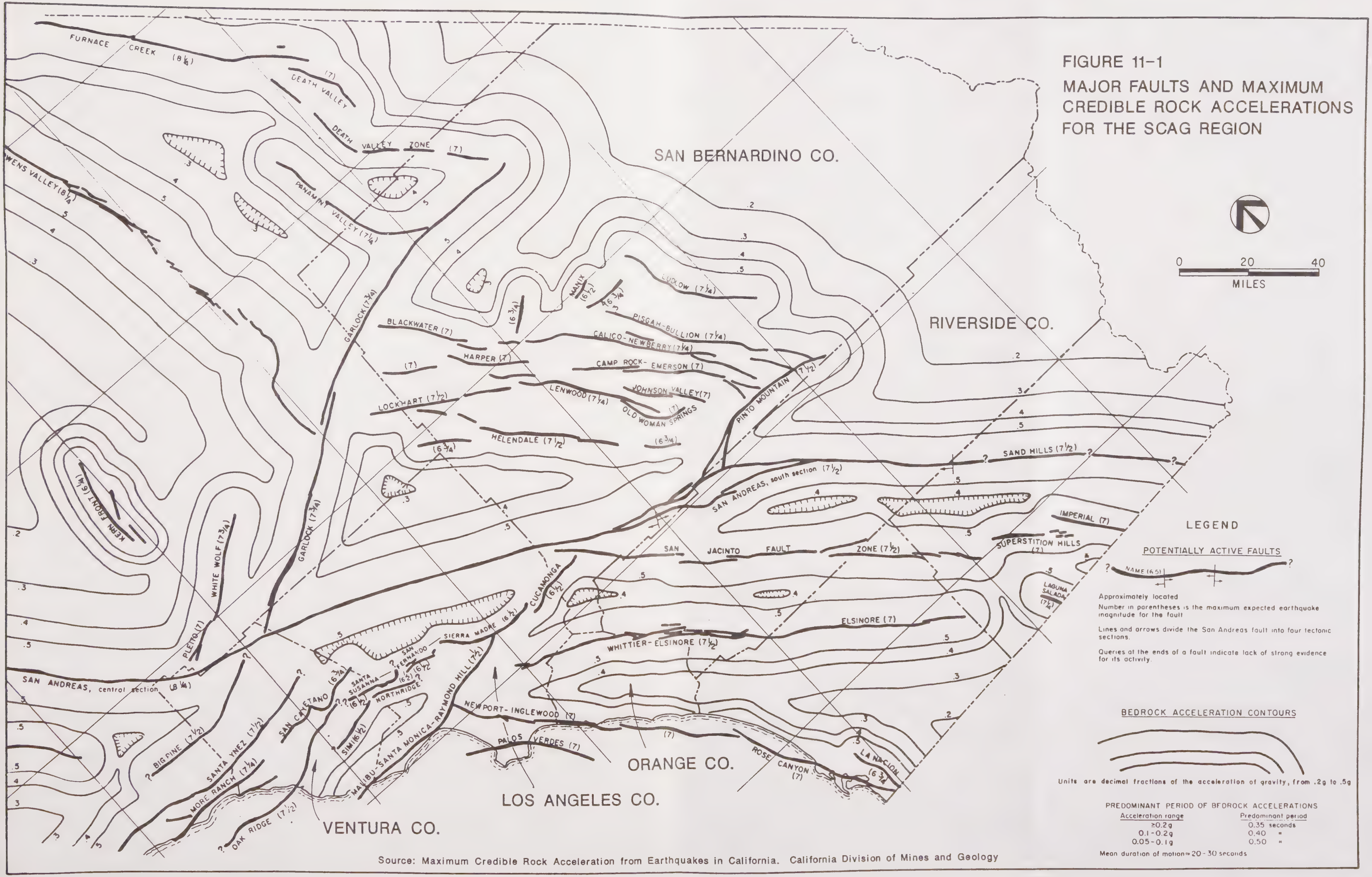


FIGURE 11-1
MAJOR FAULTS AND MAXIMUM CREDIBLE ROCK ACCELERATIONS FOR THE SCAG REGION

Source: Maximum Credible Rock Acceleration from Earthquakes in California. California Division of Mines and Geology

The final element in the chain of seismically induced hazards is open water. Tsunamis or ocean waves may be created by offshore movements of the earth's crust during an earthquake or other movements of large earth masses. Tsunami waves are capable of traveling great distances and may affect areas very distant from the epicenter of an earthquake. The location and magnitude of tsunami waves is extremely unpredictable, but for safety reasons it should be anticipated that these waves will reach coastal areas soon after any significant seismic activity. Seiches are created by accelerations of relatively large bodies of land-based water sources in lakes and reservoirs during movement of the earth's crust. The complex reflection, refraction, and superposition of these seismically generated waves in open water areas can create the kind of dangerous wave and water movements that constitute a seiche. Seiches are generally confined to lakes and reservoirs close to a quakes' epicenter.

Impacts and Mitigation Measures

Proposed Project

Impact: Increased Exposure to Seismic Hazards. Growing populations and expanding urban areas generate more structures to accommodate the population and likewise provide a greater potential for damage during future seismic events. Since so many faults underlie the heavily populated areas of the SCAG region, J/H balances implemented for the proposed project would not substantially affect the amount of damage inflicted by seismic events.

Direct earthquake damages are counted in loss of life, personal injury, and damage to structures resulting from surface rupture, ground shaking or other seismically induced hazards. Indirect damages resulting from a major earthquake are counted mostly as long-term economic effects dealing with lost productivity. Damaged industrial, office, and commercial buildings may curtail employment by incapacitating workers and causing productivity losses in the region. Insurance companies may be bankrupted through the immense financial burden of damages or may not be able to fully compensate insured parties. Businesses and families may be reluctant to invest in or live in the region following such a devastating event.

The SCAG region contains the Los Angeles metropolitan area, which is a major economic entity in the region, the state of California, and the nation. The crippling effects of a major earthquake in the Los Angeles area would have long-term effects on regional, state, and national economies. Recovery from a severe earthquake in the Los Angeles metropolitan area would require huge sums of money that would need to be diverted from other programs on both state and federal levels. These long-term impacts from earthquake damages could be more severe than the direct damages and loss of life directly incurred by a large quake.

Increased exposure to seismic hazards is considered a significant impact. The following measures would reduce this impact, but not to less than significant. Therefore, this impact is unavoidable.

Mitigation Measures

o None available.

The following measures would partially reduce this impact, but not to less than significant.

o Local jurisdictions within the SCAG region should continue to:

- implement the Alquist-Priolo Act by identifing areas of severe seismic hazard and avoid them as development areas. The Alquist-Priolo Special Studies Zone Act provided for the identification of surface rupture areas along faults and requires a geologic investigation of sites within these zones before construction is permitted. Santa Barbara County has prepared a report evaluating seismic hazards within the county. The report identifies the relative geologic hazards in the county with respect to severity, frequency of occurrence, and ability to rectify damage or dangerous conditions (U. S. Geological Survey 1985); geologically or seismically hazardous areas of Santa Barbara County are avoided as development areas by using information in land use plans implemented throughout the county.

- develop disaster relief programs to serve the entire SCAG region and improve interjurisdictional coordination. Disaster relief plans have been prepared for various areas within the region. Additional plans should be prepared on a neighborhood basis and integrated into plans for citywide relief or other subareas so that a fully coordinated disaster relief program free of conflicts can be prepared. Neighborhood areas should have disaster relief plans since transportation probably will be severely limited following a quake, and residents also may be limited to makeshift aid and meager resources for several days in a small area. Preparation of disaster relief plans for intermediate-sized areas would provide flexibility in the system for numerous contingencies.

- institute programs to identify those structures throughout the SCAG region that are especially vulnerable to earthquakes and should endeavor to repair or replace dangerously vulnerable buildings. Los Angeles has instituted a program for repair or demolition of unreinforced masonry buildings believed to be highly susceptible to damage from seismic events.

- comply strictly with ordinances and regulations governing construction of homes, buildings, and facilities in seismically active areas. This measure would significantly reduce the potential for damage to new development from future seismic activity in the region.

GMA-1

Impact: Increased Exposure to Seismic Hazards. As population growth and expansion of urban areas continues, more people, property, and structures will be located in seismically hazardous areas. The impacts of seismic hazard exposure that are expected for population distributions proposed under GMA-1 would not differ significantly from those expected for the proposed project. This significant impact could be reduced to a less-than- significant level with the following measures.

Mitigation Measures

o Same as those identified for the proposed project.

GMA-2, GMA-3, and GMA-4

GMA-2, GMA-3, and GMA-4 would not differ significantly from impacts resulting from the proposed project. Mitigation measures proposed for the proposed project are applicable for all alternatives and should be implemented regardless of the alternative chosen.

AGGREGATE RESOURCES

Setting

The principal impact of growth in the SCAG region with respect to geology is associated with the availability of Portland Cement Concrete (PCC) grade aggregate sources in the SCAG region. PCC is used extensively throughout the region in the construction of footings, foundations, retaining walls, roads, bridges, curbs, freeways, and buildings. Failure to consider the availability of this indispensable building material in plans for the SCAG region could critically frustrate or curtail growth.

As PCC grade aggregate resources near depletion, costs will increase dramatically. Rising aggregate costs also would raise construction costs. These price escalations could bring a noticeably higher cost of living and produce other regionwide economic effects that could affect growth.

Areas where significant resources of PCC grade aggregate occur have been identified by the CDMG under the California Surface Mining and Reclamation Act (California Department of Mines and Geology 1987). Several production-consumption regions were delineated within the SCAG region by CDMG. Nearly all of the production consumption regions within the Los Angeles metropolitan area have insufficient aggregate supplies to meet demands projected for the next 50 years. The San Fernando production consumption region aggregate supply is expected to last fewer than 6 years at present consumption rates. The situation is further complicated by the fact that the remaining significant aggregate supplies for the Los Angeles metropolitan area are under the jurisdiction of as few as three local governing agencies (Beeby pers. comm.).

Existing aggregate resource availability is affected by land uses adjacent to or on mining sites in addition to actual consumption. Residential, commercial, or similar development of potential mine sites generally precludes future mining of aggregate resources. Incompatible land uses such as residential, schools, and commercial areas that are adjacent to present and future mining sites may inhibit mining activities. Similarly, land uses along mine access routes can conflict with the transport of aggregate materials.

Impacts and Mitigation Measures

Proposed Project

Impact: Depletion of PCC Aggregate Sources Would Increase Construction Costs. Depletion of available PCC grade aggregate sources through consumption or conflicting land uses is expected to significantly impact construction costs. Should it become necessary to haul aggregate over long distances or create it by crushing rock, the cost of most construction, particularly large concrete buildings, would increase dramatically. Economic impacts of higher material costs would include higher housing costs and increased costs for lease and acquisition of commercial space; SCAG region residents would be indirectly affected through increased living costs. Impacts of PCC grade aggregate resource depletion are considered a significant impact of growth in the SCAG region. To reduce these impacts to a less-than-significant level, the following mitigation measures should be implemented.

Mitigation Measures

- Local jurisdictions in the SCAG region should continue to comply with the Surface Mining and Reclamation Act, which requires them to incorporate mineral resource management policies into their general plans, such as the implementation of land use planning strategies that avoid future development on lands containing significant PCC grade aggregate resources and that site compatible uses adjacent to aggregate resource sites and along mine access routes.

GMA-1

Impact: Depletion of PCC Aggregate Sources Would Increase Construction Costs. Depletion of PCC aggregate resources is expected to result in greater expenses in the supply and transportation of aggregate. The effect of increased aggregate prices would directly impact construction costs and indirectly affect the entire region as part of a higher cost of living.

Impacts of aggregate depletion in the SCAG region for GMA-1 do not significantly differ from those predicted for the proposed project.

Mitigation Measures

- Same as those identified for the proposed project.

GMA-2, GMA-3, and GMA-4

GMA-2, GMA-3, and GMA-4 would not significantly differ from impacts resulting from the proposed project. Mitigation measures proposed for the proposed project are applicable for all alternatives and should be implemented regardless of the alternative chosen.

HYDROLOGY

Setting

Five distinct hazards are posed by hydrologic conditions in the SCAG region. The most common of these are rainfall events in the metropolitan areas where impervious surfaces are more prevalent. Rainfall on these surfaces cannot infiltrate the soil, thus runoff volumes generated by a storm are increased with respect to existing conditions. Most urban areas of the SCAG region have planned for and installed adequate storm drainage facilities to accommodate the increased runoff volumes. It is assumed that new development in urbanizing areas will include adequate drainage facilities to mitigate exposure to potential flood hazards in the SCAG region.

Mountainous or hilly areas of the SCAG region are often susceptible to damage in the form of rainfall-induced mudslides. While actual drainage of these areas is not a problem, saturation of the soils can occur to the point that they become unstable and then flow in the form of landslides or mudslides, damaging homes and property. The problem is especially acute when these areas have been denuded by fires. Under these conditions, a major storm event affecting the mountains and hills of the region is estimated to produce as much as 130,000 cubic yards of debris per square mile (State of California 1978).

Flash floods occur in the desert areas of the SCAG region, usually when a thunder shower releases a burst of precipitation directly over a relatively small watershed. Because there is little vegetation to impede the flow of water in desert areas, runoff flows quickly down the slopes. At present most of the SCAG region desert area susceptible to flash flood hazards is much less densely populated than the Los Angeles metropolitan area. Because of this, exposure to flash flood hazards in the SCAG region is minimal.

Riverine flooding is limited to low-lying areas adjacent to rivers. When significant volumes of precipitation fall over a large area of a watershed, runoff volumes can create floods along the river. The most extensive damage due to riverine flooding has occurred along the Santa Ana River channel. The U. S. Army Corps of Engineers (COE) is improving the channels and other flood control facilities to prevent future flooding. The COE's report on the Santa Ana River Mainstem ("All River Plan") involves the Counties of San Bernardino, Riverside, and Orange and a populace of approximately 2 million who are continuing to face a severe threat of flooding from the Santa Ana River. The COE has determined that flooding of this river could cause an estimated $12 billion in damage and loss of life in a severe flood. The Santa

Ana River Mainstem project would provide for much needed flood protection through the construction of improvements including the Seven Oaks Dam, Mill Creek Levees, and the San Timoteo Creek Channel in the upper Santa Ana River, and downstream improvements including the enlargement of Prado Dam, Oak Street Drain, Santiago Creek, and 32 miles of the Santa Ana River Channel from Prado Dam to the Pacific Ocean.

Another flooding event that occurs in the SCAG region is that generated by coastal storms. High winds drive tides onto portions of the shore that are not normally inundated, and large storm-generated waves then impinge on waterfront structures. Exposure to this kind of flooding is minimal since it is limited to a narrow corridor along the coastal area of the SCAG region.

Impacts and Mitigation

Proposed Project

Impact: Potential Aggravation of Landslide and Erosion Conditions in Hilly and Mountainous Areas. A greater number of people and structures are expected to be located in the hills and mountains of the SCAG region as growth continues. The increased exposure of people and property to potential landslides could cause loss of life and property. Exposure to landslide hazards is a significant impact. To mitigate potential exposure to landslide hazards, the following mitigation measures should be implemented.

Mitigation Measures

- Local jurisdictions in the SCAG region, in their respective general plans, should continue to require the following:
  - inspection of slopes above and below proposed developments by a geotechnical engineer prior to grading and following fine grading of construction sites and adherence to recommendations for the elimination of hazardous soil and slope conditions;
  - implementation of fire prevention measures;
  - revegetation following fire damage to reduce the amount of rock, soil, and other debris that would flow downslope during rainfall events by allowing vegetation to anchor soils and detain runoff; and
  - installation and maintenance of sedimentation basins in appropriate locations along drainages to capture sediment, mudflows, and landslides before they reach homes and other flood damageable property.

Impact: Potential Exposure of New Development in Desert Areas to Flash Floods. As growth causes expansion of urban areas into desert portions of the SCAG region, it is likely that some developments could be located in flash flood susceptible areas. Exposure to flash flood hazards is likely to cause damage to structures and property and could result in loss of human life.

These impacts of flash flood exposure are significant. To mitigate flash flood hazard exposure to a less than significant level, the following measures should be implemented.

Mitigation Measures

- Local jurisdictions in the SCAG region, in their respective general plans, should continue to:
  - identify flash flood wash areas and other geologic formations indicating past flooding activity as determined by a hydrologist or hydraulic engineer experienced with flash flood conditions;
  - require avoidance of future development in flash flood susceptible areas;
  - require that information concerning flood hazard potential be posted at all access points for parks and recreation areas, in the event of rainfall; and
  - require installation of adequate flood control structures to protect existing and future development from flash flood hazards and design of flood control structures by a registered professional engineer experienced in the design of flood control and flood protection structures for flash flood runoff events.

GMA-1

Impact: Increased Exposure to Landslide and Erosion Conditions in Hilly and Mountainous Areas and Flash Floods in Desert Areas.

Growth patterns experienced under GMA-1 are likely to create slightly greater amounts of development in the mountainous and desert regions. Impacts of landslide and debris flow and flash flood exposure may be elevated but would not significantly differ in magnitude from impacts experienced for the proposed project. These significant impact could be reduced to a less-than-significant level with the following measures.

Mitigation Measures

- Same as those identified for the proposed project.

GMA-2, GMA-3, and GMA-4

GMA-2, GMA-3, and GMA-4 would not significantly differ from impacts resulting from the proposed project. Mitigation measures for the proposed project are applicable for all alternatives and should be implemented regardless of the alternative chosen.

GMA-Low

Seismicity. The lower county and regional population totals under GMA-Low would diminish the potential hazards of seismic activity relative to the proposed project since fewer people would be living in seismically active areas of the region and fewer structures would be needed as homes, offices, commercial areas, and factories in those areas. Thus, the number of people and structures potentially subjected to seismic events would be reduced.

Projected population under GMA-Low, though lower than that of the proposed project and GMA-High, would still add a substantial number of people to the existing regional population. Structures and facilities constructed to accommodate the increased populace represent the additional exposure of property to seismic hazards above existing conditions. Similarly, a larger populace than presently exists in the region would also be potentially subjected to seismic hazards.

Aggregate Resources. PCC grade aggregate consumption is expected to be lower relative to the proposed project because of a lower regional growth rate. Regardless of any decrease in current consumption rates, PCC aggregate supplies are limited and would become increasingly limited in future years.

Hydrology. Exposure to hazardous landslide and erosion conditions and flash floods under GMA-Low would be slightly less than under the proposed project.

GMA-High

Seismicity. The higher county and regional population totals under GMA-High would increase the potential hazards of seismic activity over those of the proposed project since more people would be living in seismically active areas of the region and a greater number of structures would be needed as homes, offices, commercial areas, and factories in these areas. Thus, the number of people and structures potentially subjected to seismic events would increase.

Aggregate Resources. Aggregate consumption rates would increase over those expected under the proposed project. PCC aggregate reserves are already critically low. Increasing the region's growth rate would aggravate existing and future problems associated with the supply and demand of PCC grade aggregate.

Hydrology. Exposure to hydrologic hazards under GMA-High would be slightly higher than that under the proposed project.

CHAPTER 12. BIBLIOGRAPHY

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